CONTENTS — Pages 3-4

MAY
1960

FOUNDRY

A PENTON PUBLICATION

A SPECIAL REPORT Page 136

Equipment Buying Plans of Foundries

Inventory of Foundry Equipment

When Should Foundries Buy Equipment?

Plant Modernization—What It Can Do

CASTINGS CONGRESS AND EXPOSITION
Philadelphia, May 9-13
Page 168

An announcement
of importance to foundrymen
seeking improved
cupola operations

Higher yields of strong, dense, consistently more machinable castings are possible through the use of *new* Ferrocarbo® Briquettes...the only cupola deoxidizer containing an expanding agent, catalyst and a slag activator.

The unique expanding agent causes disintegration of the briquettes and assures maximum distribution of their active ingredients at temperatures which provide optimum reaction with the molten metal and slag.

The addition of a catalyst to the briquette promotes faster and more complete reaction of the briquette's active ingredients.

The slag activator lowers the viscosity of the slag which assures rapid and uniform distribution of the briquette throughout the slag, and promotes the absorption of the sulfur from the iron.

Ferrocarbo Distributors—Kerchner, Marshall & Company,
Pittsburgh • Cleveland • Buffalo • Detroit • Philadelphia
Birmingham • Los Angeles • Canada
Miller and Company, Chicago • St. Louis • Cincinnati

new **FERROCARBO** *briquettes*

by **CARBORUNDUM®**

see you at the
Foundry Show,
in Philadelphia,
May 9-13,
Booth 1110.

Circle 551 on Page 53

How to control casting quality:

use quality-controlled alloys from Reynolds Aluminum

REYNOLDS INGOT DISTRIBUTORS

Abasco, Incorporated
P. O. 13367
Dallas 20, Texas

American Alloys Corp.
4446 Belleview
Kansas City, Mo.

Atlas Metal Co.
8550 Aetna Road
Cleveland 4, Ohio

Barth Smelting Corp.
99-129 Chapel Street
Newark, N. J.

Bay State Refining Co.
8 Montgomery Street
Chicopee Falls, Mass.

W. F. Jobbins, Inc.
North Lake Street Rd.
Aurora, Ill.

Morris P. Kirk & Son, Inc.
2700 South Indiana St.
Los Angeles, Calif.

Milward Alloys, Inc.
Lockport, N. Y.

Milwaukee Chaplet Co.
8656 West National Ave.
Milwaukee, Wisc.

Richards Corporation
356 Commercial St.
Malden, Mass.

Sipi Metals Co.
1720 N. Elston Ave.
Chicago 22, Illinois

Sonken-Galamba Corporation
2nd and Riverview
Kansas City, Kansas

Nathan Trotter & Co., 36 N. Front Street, Philadelphia 6, Pa.

One good way to be sure of uniformity and high quality in your aluminum castings is to be sure of the quality of the pig or ingot you use. Many foundries have solved their quality-control problems by using Reynolds Aluminum pig and ingot along with Reynolds technical and consulting services. (You get *more* than metal when you buy from Reynolds.) High standards, painstaking production and inspection methods all assure the consistent high quality of Reynolds casting alloys.

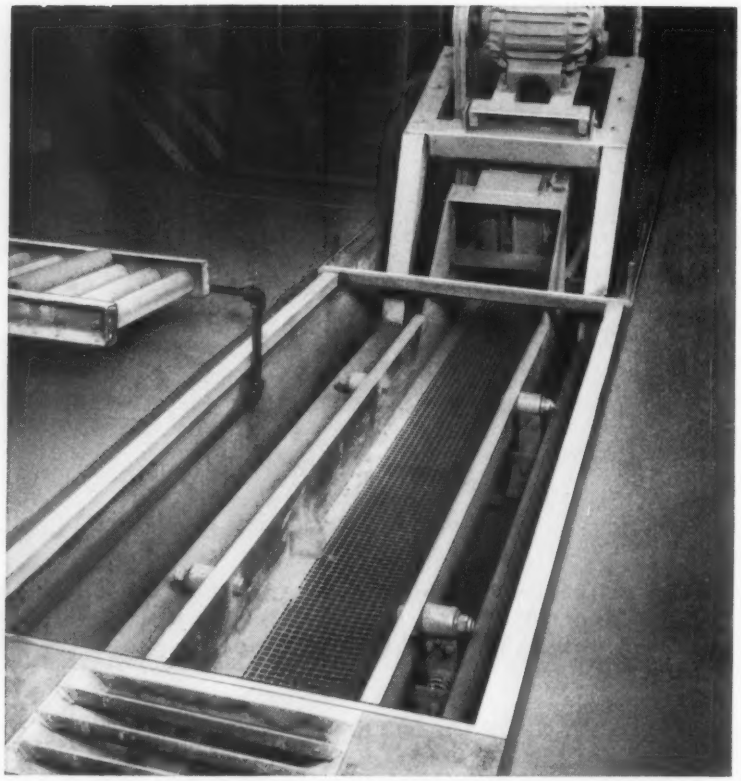
In addition to the large stocks of casting alloys maintained at our producing plants—Jones Mills, Arkansas and Troutdale, Oregon—an important part of Reynolds service to the foundry industry is a nation-wide network of ingot distributors whose extensive stocks are even closer to you. *Reynolds Metals Company, P.O. Box 2346-FK, Richmond 18, Virginia.*

REYNOLDS ALUMINUM

Watch Reynolds TV shows—**"ALL STAR GOLF"**, **"BOURBON STREET BEAT"** and **"ADVENTURES IN PARADISE"**—**ABC-TV**

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

Circle 554 on Page 53

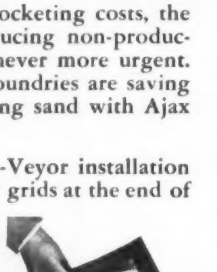


Photograph shows Ajax Lo-Veyor installed below floor. Floor grids similar to those shown in foreground have been removed to show arrangement of conveyor pan with screen.

AJAX Vibrating Conveyors
Cut Screening and Handling Costs
in Large and Small Foundries

With today's skyrocketing costs, the importance of reducing non-productive expense was never more urgent. Large and small foundries are saving money by conveying sand with Ajax Lo-Veyors.

Photograph shows part of a complete Ajax Lo-Veyor installation in a bronze foundry. Molds are dumped on floor grids at the end of each of ten pouring lines. Large lumps, core butts, and refuse are screened from the sand while being conveyed to the reconditioning system.



Send for latest AJAX SELECTION GUIDE

Learn how Ajax Vibration Engineering Service can help you cut your costs. Phone, write, or send coupon for your copy of this helpful book.

AJAX FLEXIBLE COUPLING CO. INC.
204 Portage St., Westfield, N. Y.

In Canada—The Alexander Fleck, Ltd., Ottawa

Please send Ajax Lo-Veyor Selection Guide to

Name_____

Concern_____

Address_____

SALES REPRESENTATIVES IN THE FOLLOWING CITIES

ATLANTA
The Alfred Halliday Co., Inc.
174 Fourteenth St., N. W.

BIRMINGHAM
S. L. Morrow Engineering Co.
113 North 9th St.

BOSTON
J. F. Collins
16 Coolidge Rd.
Belmont, Mass.

BUFFALO
Arthur E. Jones Co.
3 Stevenson Blvd

CHICAGO
R. R. Baumann
2447 W. Belmont Ave.

CINCINNATI
Howard S. Gans
5167 Chantilly Drive

CLEVELAND
The Hooper Trans. Equip. Co.
3109 Mayfield Rd.

DALLAS
Tate & Roe Company
5542 Dyer St.

DENVER
Colorado Bearing Co.
1650 Blake St.

DETROIT
Edward A. Barch
2842 W. Grand Blvd.

INDIANAPOLIS
Harkins Engineering Sales Co.
6349 Guilford Avenue

KANSAS CITY
Boyd Goodhart and Associates
2201 Grand Ave.

LOS ANGELES
The A. W. Nash Company
2112 So. Atlantic Blvd.

LOUISVILLE
The Alfred Halliday Co., Inc.
719-721 S. Preston St.

MEMPHIS
The Alfred Halliday Co., Inc.
1473 Madison Ave.

MINNEAPOLIS
The R. J. S. Carter Company
1219 Flour Exchange Bldg.

NEW YORK
James T. Gordon Company
233 Broadway

OTTAWA, ONT.
The Alexander Fleck Limited
75 Spencer St.

PHILADELPHIA
George Kelso Company
Upper Darby, Pa.

PITTSBURGH
J. Guy Griffith Co.
1251 Union Trust Bldg.

RICHMOND
Frank Howell Company
17 East Cary

ST. LOUIS
Capstick & Company
2337 South 13th St.

SAN FRANCISCO
Samson Sales Co.
420 Market St.

SEATTLE
Stephen Thurlow Company
1912 Minor Ave.

SYRACUSE
Arthur E. Jones Company
605 Eckel Theater Bldg.

VANCOUVER, B. C.
Fleck Bros. Ltd.
110 Alexander St.

Circle 555 on Page 53

May 1960
Volume 88—Number 5

FOUNDRY
A PENTON PUBLICATION

Many factors influence the foundryman's selection of the amount and type of equipment he needs for efficient and profitable operations. When to replace equipment is affected by the same factors. A special report on this subject starts on Page 136.

Age Creeping Up 135
Editorial—By FRANK G. STEINEBACH

Meeting the Competition of the '60s 136
SPECIAL REPORT: Articles in this series look at the problem of equipping to meet competition in the new decade. Individually, they discuss foundry buying plans, an inventory of foundry equipment now in use, when equipment should be replaced, and how three foundries modernized departments

Foundries To Spend More for Plant Equipment 136
A comprehensive study of the industry reveals that a large number of foundries plan extensive buying programs to improve their plant and equipment. Total industry expenditures may amount to as much as $200 million

1960 Inventory of Foundry Equipment 139
FOUNDRY'S survey of the physical plant of the foundry industry lists existing major units by number and age. It shows that foundries must allocate more money to modernization and mechanization to meet competition

When Should Foundries Buy New Equipment? 150
Makers of foundry equipment discuss when to buy new equipment. Most pressing reason for equipment purchases is the need to meet competition of other foundries or other processes by increasing quality and reducing costs

What Modernization Did for Three Foundries 156
Three case histories demonstrate how modernization achieved "Efficient Cleaning," improved "Cupola Melting," and provided "Automatic Molding" at, respectively, steel, gray iron, and malleable iron foundries

64th Annual AFS Congress and Exposition . . . 168
Philadelphia Is Site of 1960 Congress 168
List of Exhibitors 171
Technical Program 174
Annual AFS Awards 180

Revising Cleaning Room Incentive Plans 203
Standard hour one-for-one incentive plan provides many advantages over plans which use tonnage as the basis for incentive pay—By JOHN R. WALLEY

Risering Aluminum Castings 216
Gating and risering are interdependent. Size, shape, and location of gates often are dictated by risering, and risers should not be chosen without considering gating—By H. F. TAYLOR, M. C. FLEMINGS, and T. S. PIWONKA

Improved Mold Handling Raises Production . 230
Installation of modern equipment is reported to have increased castings production 25 per cent at the Deming Co. iron foundry in Salem, Ohio

Man to Man 239
A successful foundry knows more than how to make good castings. It also knows the language and needs of its specialized clients—By RALPH L. LEE

Foundry Educational Foundation Conference 243
By WILLIAM G. GUDE

Nickel Patterns Made by Carbonyl Process . 254
New process produces nickel patterns, dies, molds, and coreboxes by carbonyl or gas deposition. Delivery is sped up and pattern life increased

CONTINUED NEXT PAGE

Editor: FRANK G. STEINEBACH
Managing Editor: WILLIAM G. GUDE
Metallurgical Editor: EDWIN BREMER
Associate Editors: ROBERT H. HERRMANN, JACK C. MISKE
Assistant Editors: VIRGINIA C. TAYLOR, VIRGINIA B. HARMS, BETTY GAUGHAN
Art Editor: DON S. CADOT

CONTINUED FROM PAGE 3

Winners Picked in Zinc Diecasting Contest . . 268

Winners of contest for lightweight, thin-wall zinc diecastings include a speaker basket, a combination washer-dryer part, and a coat-suit hanger

Selecting Abrasives for Economical Cleaning . 278

Choosing an abrasive requires consideration of four factors: Time involved for the job, equipment wear, abrasive consumption, finish needed. Here's an analysis of the problem—By DAVID E. NEUSTADT

Plastic Pattern Equipment Proves Itself 284

Growing pains of epoxy pattern and corebox materials are over. They also can open new markets to pattern shops—By WALTER H. P. SIEBERT

Polystyrene Patterns for Art Castings 290

New method of casting art objects uses foamed polystyrene plastic patterns and is reported to be simpler and less costly than traditional processes

Determining True Costs of Accidents 302

A misleading situation is created when management fails to determine the true cost of accidents. Here's a list of 12 hidden costs—By E. W. FAIR

Russian Investment Casting 309

A survey of Russian investment casting based on study of the literature, discussions, and direct observations—By NICHOLAS J. GRANT

Affirm Validity of Escalator Clauses 344

Court decisions have affirmed validity of escalator clauses in contracts when clear provisions for price determination have been made—By ALBERT W. GRAY

In Every Issue

Around the Country	270	Men of Industry	321
Calendar of Meetings	16	News Views	258
Equipment and Supplies	186	Obituary	340
Foundry Developments	228	Patents of Interest	294
How To Do It	214	Questions and Answers	182
Industry Briefs	211	Readers' Comment	127
Late News	33	Statistics	33
Literature for Foundrymen	261	The Shakeout	348
With the Editors	10		

Classified Advertising—377 Where-To-Buy—363 Advertisers' Index—384

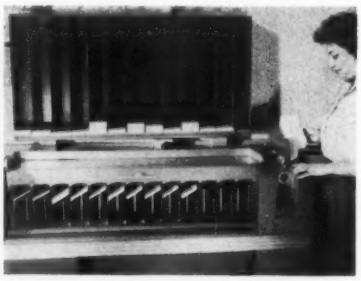
©1960 by The Penton Publishing Co. All rights reserved.
EDITORIAL OFFICES: Penton Building, Cleveland 13, Ohio. Main 1-8260. Branch Offices: New York, Detroit, Chicago, Pittsburgh, Washington, London.

FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions. Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

FOUNDRY is indexed in the Applied Science & Technology Index and the Engineering Index, generally available in libraries. Microfilm copies are available from University Microfilms, 313 N. First Ave., Ann Arbor, Mich.

THE EDITORS' WORKSHOP

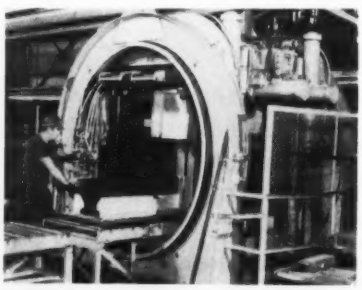
CASTING QUALITY: In their attempts to improve casting quality, foundries are finding a valuable tool in automatic punched card processing equipment. Next month we'll



relate how one investment casting foundry cut its defective castings almost 50 per cent since installation of this type of equipment. The machines also are used in analyzing job quotations and sales trends.

VARIETY: A wide range of subjects is covered by the articles scheduled for coming months. June will mark the start of a series on gating and risering of steel castings. Other future topics include sand moisture control, high-strength gray iron, diecasting die design, reduction of cleaning room noise, ultrasonic cleaning, and properties of brass alloys.

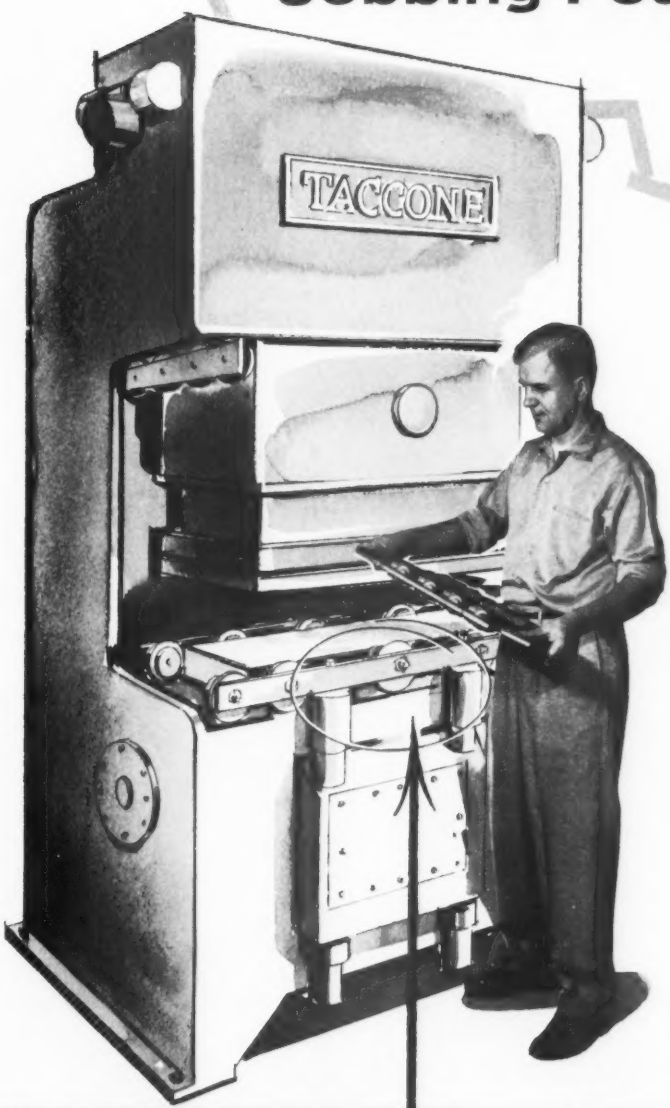
HANDLING: How materials and products are handled often is an important factor in effectiveness of



a process. A feature article in the June issue will describe how Cincinnati Milling Machine Co. has mechanized its production of cores made with an air-setting binder.

Match Plate Machine Adaptable to Jobbing Foundries by...

TACCONE



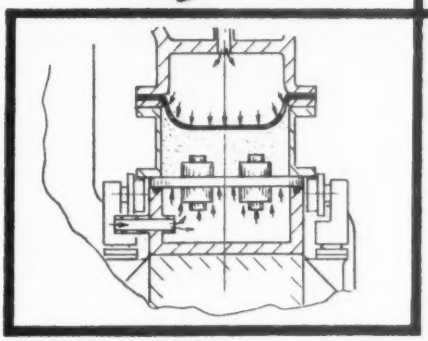
"C" frame easy accessibility—quick pattern change makes possible jobbing match plate work on production line basis.

Mold hardness—uniformity—casting definition and surface finish improvement all attained through this molding practice.

Match plate machines are resultant effort to serve the small foundry as well as large high production foundries.

Design—Engineering and manufacture of Taccone diaphragm molding equipment and automation for mold and flask handling are our specialties.

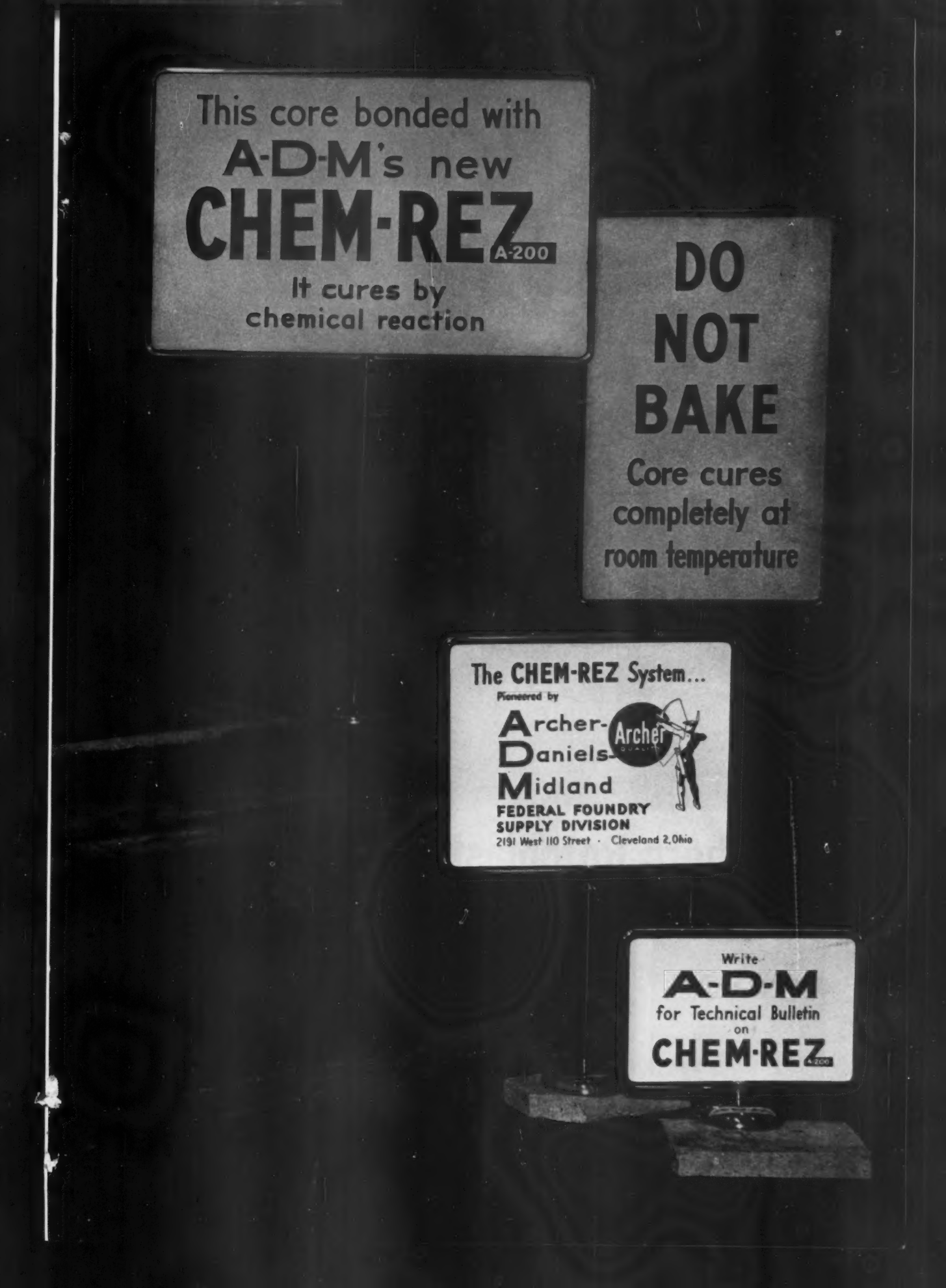
See Match Plate and Duplex Machine Foundry Show Booth 1501



TACCONE
CORPORATION
NORTH EAST • PA.

Circle 556 on Page 53

EMERGENCY ORDER
60 minutes from muller to mold
HANDLE CORE ONLY ONCE
Bypass ovens. Route directly to molding floor
WATCH FOR COLOR CHANGE
From brown to green to black as it cures
See
CHEM-REZ A 200
at the
Foundry Show
Philadelphia


This core bonded with
A-D-M's new
CHEM-REZ A-200
It cures by
chemical reaction
DO
NOT
BAKE
Core cures
completely at
room temperature
The CHEM-REZ System...
Pioneered by
Archer-
Daniels-
Midland
Archer
FEDERAL FOUNDRY
SUPPLY DIVISION
2191 West 110 Street · Cleveland 2, Ohio
Write
A-D-M
for Technical Bulletin
on
CHEM-REZ A-200

Operation: Blast Cleaning

(ONE OF A SERIES)

Pangborn Rotoblast proves itself again

Carrier Corporation, Syracuse, N.Y.—Pangborn Rotoblast cleans so quickly it has cut cleaning department labor costs 30% to 40% . . . saving $15,000 a year.

Master Electric Company, Dayton, Ohio—Two 12 cu. ft. Rotoblast Barrels with automation reduce labor costs by 50%—save $15,000 a year in manpower alone! Clean 33 tons of gray iron castings a day with ease.

Meadville Malleable Iron Co., Meadville, Pa.—Pangborn Roto-

And Rotoblast Steel Abrasives

In foundries, forges, steel and metal working plants all over America, premium quality Rotoblast Steel Shot and Grit are replacing other metal abrasives as they *prove* their ability to blast clean at lower cost. Lansing Drop Forge Co.—a typical

Typical Rotoblast Barrel, Ft. Pitt Steel Castings Co., McKeesport, Pa.

...and again...and again...and again!

blast cut 24 man-hours daily to 15 . . . cleans loads three times as large in half the time.

Ingersoll Rand Co., Painted Post, N.Y.—Pangborn Rotoblast cleans 74,000 lbs. of castings per day, cuts cleaning time in half and substantially reduces costs.

Buckeye Iron & Brass Co., Dayton, Ohio—Pangborn Rotoblast is automated to reduce labor requirements even further, cuts 15 minutes blast time to just 4½.

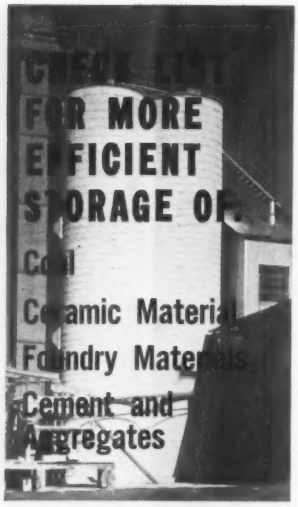
Results like these explain why two of the world's leading automotive manufacturers have just ordered *nine* 32 cu. ft. capacity Rotoblast Barrels! If *your* problem has to do with blast cleaning, talk to your Pangborn man or write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *"Come to Pangborn" equipment display at Philadelphia Foundry Show, May 9-13.*

prove their value, too!

user—switched to Rotoblast S-390, cut abrasive cost by 23%. An Ohio foundry cut shot consumption from 27 lbs. per wheel hour to 7.8 lbs. with Rotoblast S-330. Let us show you what Rotoblast abrasives will do for you.

Pangborn
OF HAGERSTOWN

Circle 558 on Page 53



For bulk storage of any material, you can't beat the versatility of a Marietta storage system to save you time, money, space and materials. Marietta Concrete Silo Systems are engineered to your exact requirements for safe, economical storage and complete integration with any materials handling equipment.

When you consult Marietta, trained personnel make an exhaustive study of your operation, define your precise needs and then recommend and design a storage system to meet these needs. You benefit from (1) elimination of bag or ground storage; (2) faster materials handling; (3) reduced material loss; (4) complete weather protection; (5) better use of storage area; (6) lower inventory, and (7) lower insurance rates.

For catalog and complete information on how Marietta Industrial Silos can modernize your bulk materials storage, simply check below the type of material you want to store, clip and attach to your letterhead. Your request will receive our immediate attention.

Send Catalog and Information

- ☐ Sand & Gravel
- ☐ Cement
- ☐ Coal
- ☐ Ceramic Materials
- ☐ Other

Marietta
CONCRETE DIVISION
AMERICAN-MARIETTA CO.
Marietta, Ohio

Circle 559 on Page 53

With the Editors

SIXTH TIME: This is the sixth time in 64 years that the American Foundrymen's Society has met in Philadelphia. Organized in the city of brotherly love as the American Foundrymen's Association in 1896, the AFS has returned there in 1907, 1928, 1934, 1948, and 1960. I recently checked FOUNDRY's report on the organization meeting and found it most interesting.

—o—

Cover the Country: On May 12, 1896, from 350 to 400 "delegates" met in Philadelphia at the invitation of the Philadelphia Foundrymen's Association to "bring about a more friendly feeling among the foundrymen of this country and to present and discuss papers on interesting subjects and to encourage the formation of foundry associations in every part of the United States where it is possible to do so, believing in the end good results must follow, the idea being to advance the foundry business in every way."

—o—

About the Industry: In opening the first session, Francis Schumann, Tacony Iron & Metal Co., Tacony, Philadelphia, and president of the Philadelphia Foundrymen's Association, greeted the delegates on behalf of the association. He commented on the industry as follows:

"We have undertaken to bring together here those interested in the welfare of an industry consisting of nearly 4000 separate establishments, with an aggregate capital invested of about $115,000,000, employing about 120,000 persons, whose annual wages amount to nearly $63,000,000. Some 2,600,000 tons of castings are produced annually, requiring 430,000 tons of coal and coke. The total annual disbursements for material and labor amount to $114,000,000."

—o—

The Purpose: The following from Mr. Schumann's remarks sounds faintly familiar, and gives one reason why the founding fathers wanted an association:

"Prices have taken a downward course, far below that which healthy competition would warrant; it has not only resulted in greatly deteriorating the character of the product and undermining the finer sense of honor of the individuals engaged, but is also testing to its utmost the endurance of strong establishments whose very existence is at stake, no matter how well prepared they may have been at the beginning of the struggle. We are living in an era of conflict; on the one hand, organized and concentrated capital; on the other, that which is scattered and disunited. Weak or partial organization will not avail. Unless all engaged in an industry will unite and adopt vigorous measures that may be rigidly enforced for controlling the individual members, the result will be failure."

—o—

AFA Founded: After three days of meetings, including sessions with technical papers on such subjects as chemistry of iron; strength of cast iron; apprenticeships; foundry cranes; acid open hearth vs. basic open hearth; air compressors; cupola practice; green, dry, and loam molding; sand blast for cleaning; and molding machines and their appliances, the American Foundrymen's Association was born. John A. Penton, founder and editor of FOUNDRY, was elected the first secretary.

—o—

Training Detectives: The idea of a badge with the delegate's name evidently had not been invented. Instead, as each visitor registered, he was given a badge with a number, as shown in the accompanying sketch. By referring to a printed list as it appeared each day in *The Daily Foundry*, "A stranger could easily identify anyone and discover at the same time their residence and business affiliation."

What a performance!

—o—

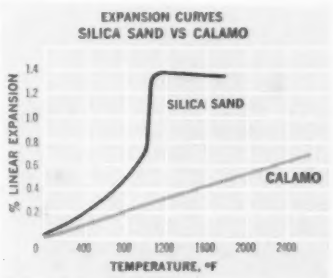
Back with Exhibit: Returning to Philadelphia in 1907, the convention reviewed the "rapid advancement

FOR BETTER METAL CASTING... HARBISON-WALKER REFRACTORY MOLD MATERIALS

Calamo for investment molds

CALAMO, one of the extensively used Harbison-Walker products for molding, is an alumina-silica refractory of optimum sizings for various molding mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

The chart shows the exceedingly desirable expansion curve of CALAMO compared with that of silica.



CALAMO, used as the major constituent of precision casting investment mixes, improves dimensional constancy of molds, makes them stronger and more resistant to erosion by metal flow.

Investment costs are measurably reduced because an appreciably lesser amount of bonding agent is needed. This is attributable to the very desirable particle sizing and the equiaxed, dense grains of CALAMO.

CALAMO, used alone or as the major part of conventional dry sand molding mixes in rammed, or in slinger-place sand molds, provides not only the very desirable low thermal expansion particularly suited for precision casting but also the refractoriness for metals and alloys melted at unusually high temperatures.

H-W Flintgrain

for ceramic shell molds

H-W FLINTGRAIN is an alumina-silica refractory, similar in composition to CALAMO, having the same very desirable low thermal expansion characteristics, but greater angularity of grain shape.

The angular grain shape and optimum size distribution make H-W FLINTGRAIN ideal for securing maximum compactness in the mold. It is used with special benefit for making ceramic shell molds and for similar applications in which dense, compact mold sections of greatest volume stability at all temperatures, are of paramount importance.

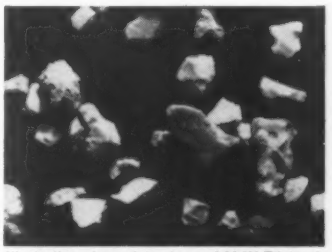


Illustration of angulate shape of H-W Flintgrain enlarged x3

H-W Moldsand Bond

H-W MOLDSAND BOND is a highly refractory clay having unusual plasticity and bonding strength for conventional molding. Used alone or with other binders, it imparts enhanced hot strength to molds and in some mixes replaces, wholly or in part, binders of higher cost. It is used with equally good results for the usual rammed mixes with sand or CALAMO. Molding mixes made with H-W MOLDSAND BOND have decidedly improved storage properties.

HARBISON-WALKER REFRACTORIES CO.

AND SUBSIDIARIES

GENERAL OFFICES: PITTSBURGH 22, PA.

World's Most Complete Refractories Service

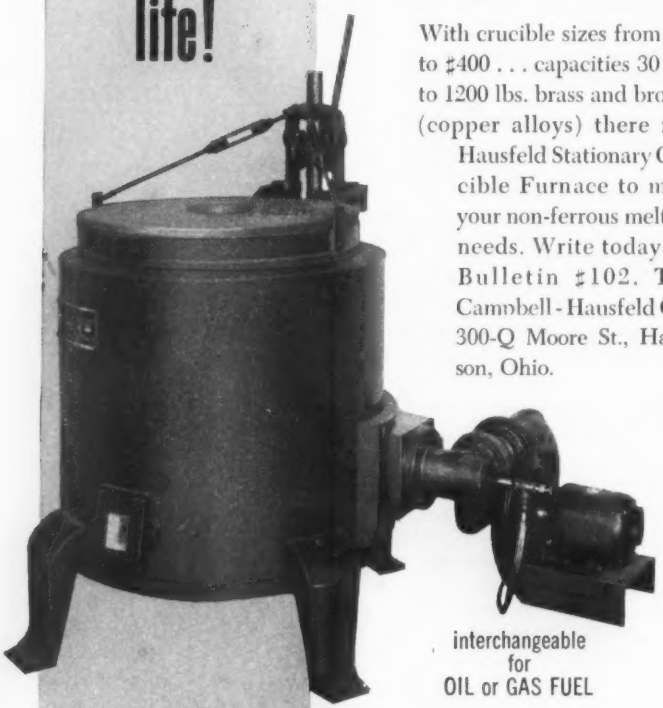
Circle 560 on Page 53

Engineered for longer crucible life!

■ In the Oil Fuel models, as shown, the special higher-pressure mechanical atomizing oil spray—a Hausfeld exclusive—produces a clear, hot flame with minimum cutting action . . . *increases* crucible and lining life.

■ Well insulated lining assures uniform heat dispersal—cuts heat loss and assures many years of fast, efficient melting of brass and bronze.

With crucible sizes from #10 to #400 . . . capacities 30 lbs. to 1200 lbs. brass and bronze (copper alloys) there is a Hausfeld Stationary Crucible Furnace to meet your non-ferrous melting needs. Write today for Bulletin #102. The Campbell-Hausfeld Co., 300-Q Moore St., Harrison, Ohio.



interchangeable for OIL or GAS FUEL

Hausfeld STATIONARY CRUCIBLE FURNACES

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

of the foundry trade since the formation of this organization 11 years ago." The feature of that meeting was a large exposition of foundry supplies and equipment staged by the Foundry Supply Association in the Second Regiment Armory. The following exhibitors in 1907 also will be at the 1960 show: Joseph Dixon Crucible Co., Herman Pneumatic Machine Co., Link-Belt Co., S. Obermayer Co., Oliver Machinery Co., Osborn Mfg. Co., Thomas W. Pangborn Co. (Pangborn Corp.), Henry E. Pridmore (International Molding Machine Co.), Standard Sand & Machine Co. (National Engineering Co.), Tabor Mfg. Co., and Yale & Towne Mfg. Co.

—o—

An International: The Fifth International Foundry Congress and the 38th Annual Convention of AFA were held in Philadelphia in 1934, with 4000 foundrymen from home and abroad in attendance. Dan M. Avey, editor of FOUNDRY, was named president of the association.

—o—

Ductile Iron: Looking back, the outstanding feature of the 1948 Philadelphia convention was the presentation of two announcements of the development of nodular iron. H. Morrogh, British Cast Iron Research Association, Birmingham, England, told of treating low-sulfur, hypereutectic cast iron with cerium in the "Production of Nodular Graphite Structure in Gray Cast Iron." In a written discussion, Thomas H. Wickenden, International Nickel Co., New York, stated that his company had developed a process for production of spheroidal graphite iron with the use of magnesium or a magnesium-containing addition. The industry immediately became interested in nodular—later ductile—iron.

—o—

Philadelphia in 1960: Now, the AFS Castings Congress and Exposition returns to Philadelphia. As always, the editors of FOUNDRY will be on hand to cover both the exhibit and the technical sessions, which will be reported in our June issue. Stop in for a rest at our new booth, No. 1104. We'll welcome the chance to meet new friends and say hello to old ones.

F.G.S.

Circle 561 on Page 53

For Your Power Drive • Design • Application or Replacement Maintenance

There's a T-J CYLINDER

That Can Assure *Accurate Efficient Operation*

Only T-J's complete line can assure you a cylinder of either air or hydraulic application – with practically limitless design specifications for bore, stroke, pressure range and even delivery requirement. From the time-tested, standard tie-rod air and hydraulic, to the exclusive T-J Spacemaker, and including the recently introduced Squair Head, T-J cylinders give you more features for efficient, long-lasting operation. Write today!

Plus

THE ONLY COMPLETE ENGINEERING CATALOG LINE, TOO!

H-47 for standard tie-rod hydraulic cylinders.

SQ-1058-4 for the T-J Squair Head cylinder.

No. 54 for standard tie-rod air cylinders.

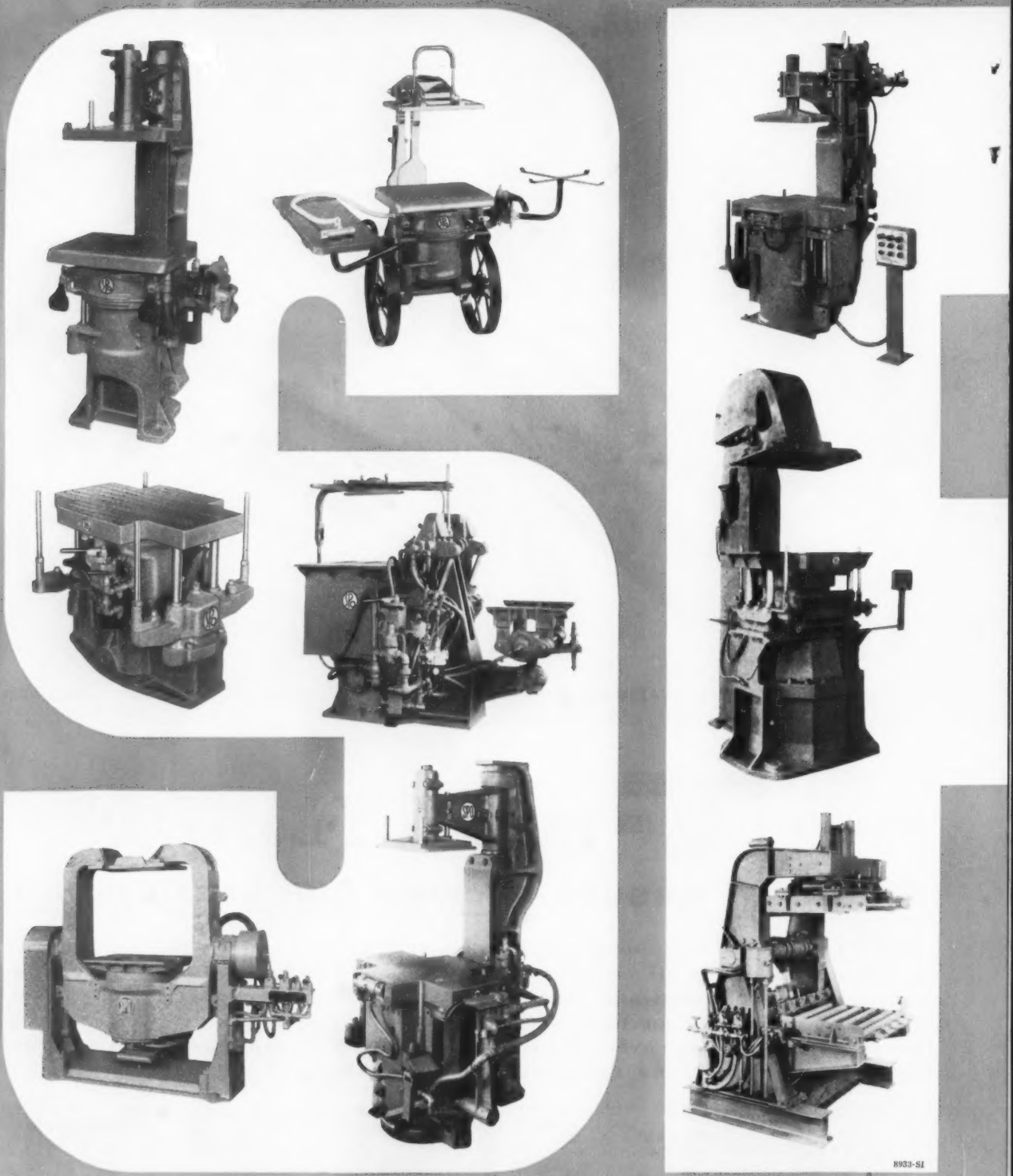
SM-56-3 for the incomparable Spacemaker cylinder.

HSM5-56-4 for the High-Pressure Hydraulic Spacemaker cylinder.

THE TOMKINS • JOHNSON CO. JACKSON, MICH.

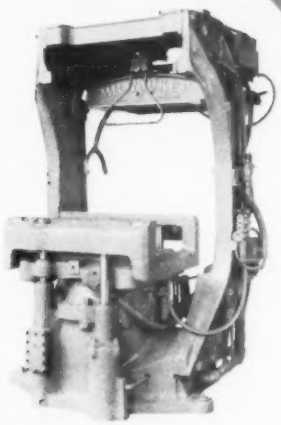
CYLINDERS • MILLING CUTTERS • RIVETERS and CLINCHERS

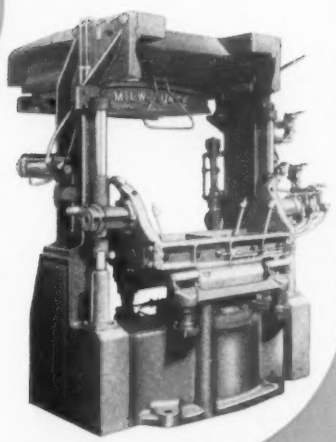
Circle 562 on Page 53

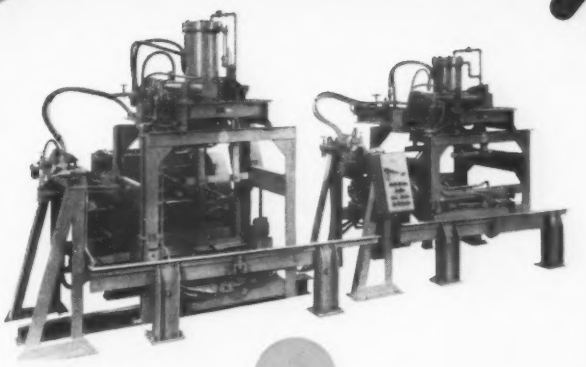


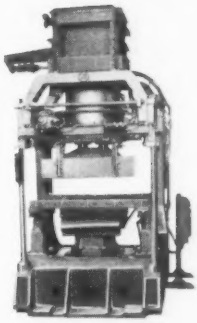
8933-SI

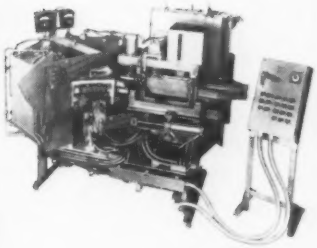
*** The world's largest supplier of molding machines**

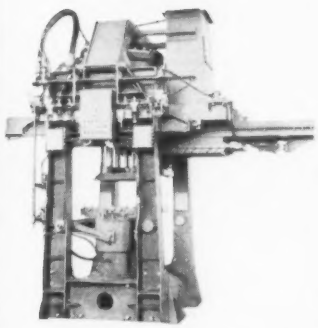


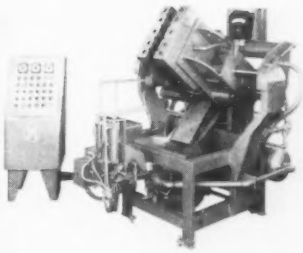


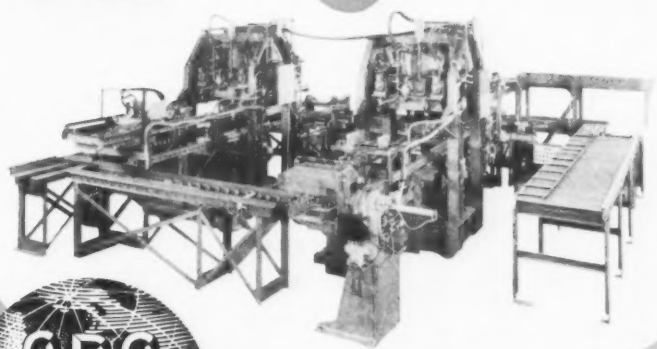












In specialized industries, leadership cannot be assumed . . . it must be earned through capability and accomplishment.

In foundry molding systems, for example, technological advances achieved by SPO . . . through Creative Engineering . . . have set the pace of molding progress during the past decade.

Creative Engineering is the keynote to SPO's leadership. It is the reason SPO can supply versatile, efficient, economical "packaged" systems, including Turnkey facilities, to meet every molding requirement. As the world's largest supplier of molding machines, *SPO is the best qualified to help analyze and solve your specific production problems.* This capability is another hallmark of leadership.

SPO

SPO INCORPORATED

8448 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO

Circle 563 on Page 53

exciting news

at the G. E. Smith Exhibit

Booth 1228
AFS 64th Annual Castings Congress & Exposition, Philadelphia

new NO-BAKES

KOLD-KURE

For jobbing type core production—a new companion product to Kold-Set.

CO-SET

For production and semi-production core making. Also, for use as a no-bake mold facing.

new WASHES

KOLD-KOTES—Developed primarily for use with *no-bake* and Kold-Set processes. Also for use in coating cores and molds made with conventional core-oil, resin, CO_2 and other binders.

Type S—for Steel Castings
Type G—for Iron and Non-Ferrous Castings

new DATA

- Zircon Washes
- Activators
- Kold-Set Facing Mix
- Feox Sand Additive

FOUNDRY TOUR

Join us in a tour of Atlantic Steel Foundry to see KOLD-KURE and KOLD-SET in Production Use.

Write or phone for a reservation.

FOR FOUNDRY PRODUCTS PROGRESS

G. E. SMITH, INC.
246 WASHINGTON ROAD
PITTSBURGH 16, PA.

Warehouse Stocks in Boston • Chicago • Philadelphia • Detroit • Indianapolis
San Gabriel, Calif. • Hamilton • Toronto • Montreal

CALENDAR of Meetings

May 9-12—Instrument Society of America, summer Instrument-Automation Conference & Exhibit, Civic Auditorium and Brooks Hall, San Francisco.

May 9-13—American Foundrymen's Society, 1960 Castings Congress and Exposition, Convention Hall, Philadelphia.

May 9-13—American Society for Metals, Southwestern Metal Exposition & Congress, State Fair Park, Automobile Building, Dallas.

May 11-13—Los Angeles Chapter, American Material Handling Society, Western Regional Materials Handling Show and Packaging Cavalcade, Great Western Exhibit Center, Los Angeles.

May 12—National Castings Council, annual meeting, Warwick Hotel, Philadelphia.

May 16-18—British Investment Casters' Technical Association, annual conference, London, England.

May 18-20—Society for Experimental Stress Analysis, spring meeting, Hotel Severin, Indianapolis.

May 23-31—Magnesium Association, annual meeting, a joint meeting with the Magnesium Industry Council of Great Britain, London and Manchester, England, and Hanover, Germany.

May 23-26—Design Engineering Show, Coliseum, New York.

June 2-3—New York University, vacuum metallurgy conference, University Heights (Bronx) Campus, New York.

June 6-7—Malleable Founders' Society, annual meeting, Elbow Beach Surf Club, Hamilton, Bermuda.

June 6-8—Material Handling Institute Inc., New England Show, Commonwealth Armory, Boston.

June 7—Hoist Manufacturers Association, Statler Hilton Hotel, New York.

June 19-21—Alloy Casting Institute, annual meeting, Homestead, Hot Springs, Va.

June 21-24—Institute of British Foundrymen, annual conference, Winter Gardens, Malvern, England.

June 21—Electric Overhead Crane Institute, Alliance, Ohio.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 4-6—European Investment Casters Conference, Liege, Belgium.

Sept. 6-16—The Machine Tool Exposition—1960, International Amphitheatre, Chicago.

Sept. 6-16 — Production Engineering Show, Navy Pier, Chicago.

Sept. 19-20—Steel Founders' Society, fall meeting, Homestead, Hot Springs, Va.

Sept. 19-24—International Foundry Congress, Zurich, Switzerland.

Sept. 22-23—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 12—Cast Bronze Bearing Institute, annual meeting, Grove Park Inn, Asheville, N. C.

Oct. 12-14—Gray Iron Founders' Society, annual meeting, Netherland Hilton Hotel, Cincinnati.

Oct. 13-15—Non-Ferrous Founders' Society, annual meeting, Grove Park Inn, Asheville, N. C.

Oct. 17-18—Magnesium Association, annual convention, Hotel Carter, Cleveland.

Oct. 17-21—American Society for Metals, National Metal Exposition & Congress, Trade and Convention Center, Philadelphia.

Oct. 17-21—National Safety Council, Annual Safety Congress, Chicago.

Oct. 20-22—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 21-23—Society for Experimental Stress Analysis, annual meeting, Pick Fort Shelby Hotel, Detroit.

Oct. 22-25—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Material Handling Institute Inc., Central States Show, Kentucky Fair and Exposition Center, Louisville.

Nov. 8-11—Society of Die Casting Engineers, First National Die Casting Exposition & Congress, Detroit Artillery Armory, Detroit.

Nov. 14-16—Steel Founders' Society, Technical and Operating Conference, Pick Carter Hotel, Cleveland.

Nov. 30 - Dec. 2 — Metallurgical Society of AIME, Electric Steel Conference, Morrison Hotel, Chicago.

A Significant NEW

NO·BAKE Binder

For Production and Semi-Production

For Cores and Molds in Iron, Steel and Non-Ferrous Casting

NO ODOR • COMPLETE COLLAPSIBILITY • MAKE AND DRAW CORE BOXES—While new to this country, *CECO-SET* is thoroughly proved effective in actual foundry practice. Remarkable economies, together with improved casting quality are achieved through use of *CECO-SET*. Minimum hand ramming is required, a long sand life is assured, there is less gas in the core—with no obnoxious smoke during pouring.

Ask for Bulletin CS-1 or see us at the AFS Castings Exposition—at the booth with the Flowering Poplar Tree.

Circle 565 on Page 53

FOR FOUNDRY PRODUCTS PROGRESS

G. E. SMITH, INC.

246 Washington Road Pittsburgh 16, Pa.

Distributors: Core-Lube, Inc., Danville, Ill. • Klein-Farris Co., Inc., Boston, Mass. • Sierra Foundry & Supply Co., San Gabriel, Calif. • George F. Pettinos (Canada) Limited, Hamilton, Ontario

For longer furnace life

SWINDELL

A modern Swindell electric furnace feature

✻ REPLACEABLE FURNACE SHELL

✻✻ FLOATING PANEL SHELL CONSTRUCTION

DISTINCTIVELY SWINDELL!

and improved furnace economics

FEATURES AN EXPENDABLE REPLACEABLE FURNACE SHELL

Affording these

ADVANCED SWINDELL OPERATING ADVANTAGES

EASY SHELL REPAIR OR REPLACEMENT

Distinctive Swindell design permits complete shell replacement in event of major accidental damage or eventual wear-out, at the comparative low cost of replacement shell only. . . . A great advance in efficiency and economy in electric melting furnace operation. Shells can be interchanged with complete ease —without any disturbance to electrode system, tilt gear, roof swing mechanism, etc. Only shell water hoses and shell clamping devices are involved.

INCREASED FURNACE AVAILABILITY

Swindell floating panel shell construction of replaceable shell type greatly increases furnace availability by reducing down time for repairs formerly required by damage to permanent shell construction. Damage to a panel does not affect the shell—the panel itself is quickly replaceable in a short interval of time.

INCREASED PRODUCTION RATES

Higher furnace availability is reflected in the sharply increased production rates provided by Swindell electric furnaces. Shortened furnace down time means more productive furnace hours per month, more tons of steel produced, better operating profits.

LOWER PRODUCTION COSTS

With the Swindell expendable furnace shell and shell panels, maintenance costs for labor and material occasioned by direct and indirect shell damage are cut to a minimum. Better over-all furnace life expectancy creates a better depreciation structure. Lower production costs are the tangible result.

HIGHER QUALITY PRODUCT

For the steelmaker who cannot tolerate contamination of a given heat by undesirable elements which may have soaked into the lining of a shell from previous heats of steel, the Swindell replaceable furnace shell is ideal. A clean shell can be swung into place almost as easily as changing kettles on a stove—absolute insurance of freedom from contamination, for a guaranteed quality product.

Let us consult on your melting requirements!

Electric Melting Furnaces —capacities from 350 lbs. to 200 tons

SWINDELL-DRESSLER CORPORATION
Engineers and Manufacturers
PITTSBURGH 30, PA.
The SWINDELL-DRESSLER CORPORATION of Canada, Ltd.,
Ottawa, Canada

SUBSIDIARY OF PULLMAN INCORPORATED

Circle 566 on Page 53

Taylor Zircon Prolongs Ladle Life...

produces cleaner metal too

Taylor Zircon No. 717 Ramming Mix is a most effective lining for ladles handling various types of iron and steel. A St. Louis foundry uses No. 717 exclusively for receiving and pouring ladles in their stainless steel and high alloy operations. They call it the best lining material they have ever used, because:

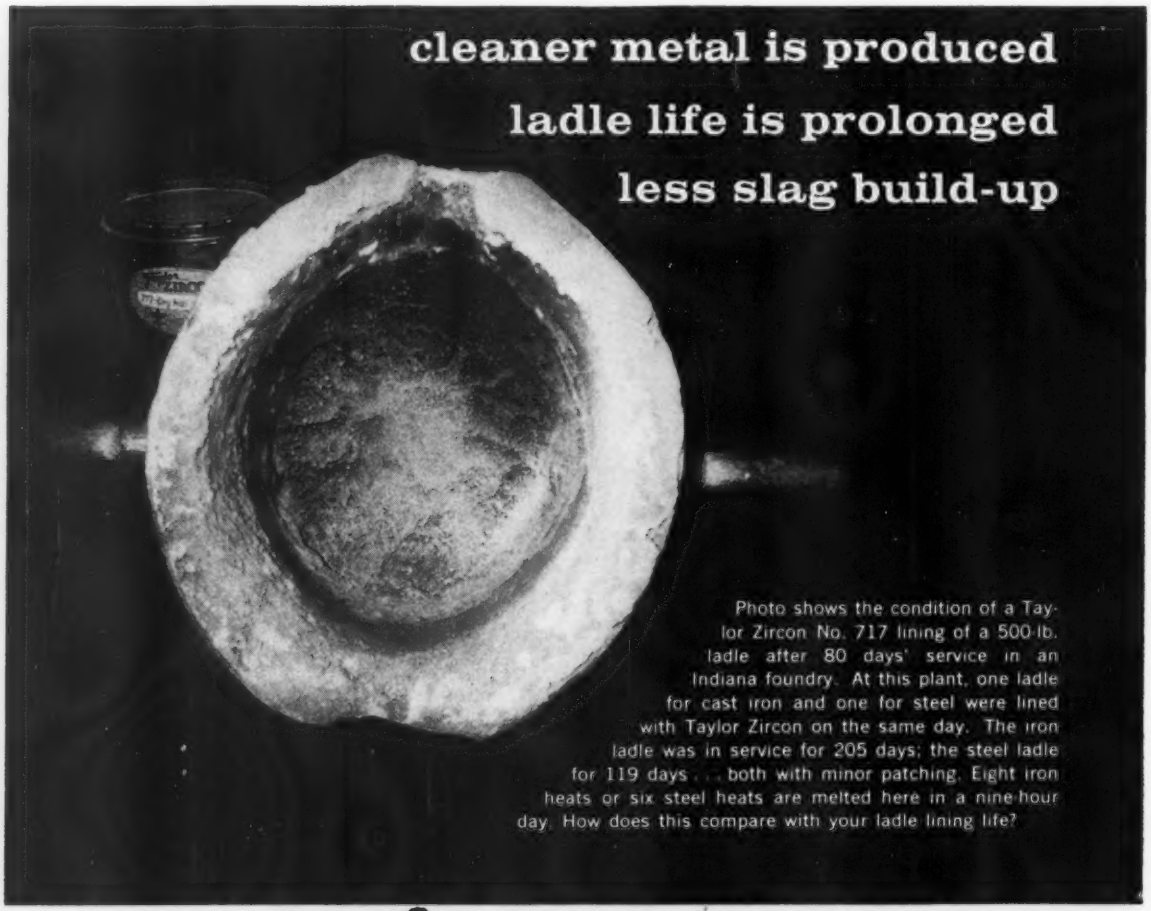


Photo shows the condition of a Taylor Zircon No. 717 lining of a 500-lb. ladle after 80 days' service in an Indiana foundry. At this plant, one ladle for cast iron and one for steel were lined with Taylor Zircon on the same day. The iron ladle was in service for 205 days; the steel ladle for 119 days . . . both with minor patching. Eight iron heats or six steel heats are melted here in a nine-hour day. How does this compare with your ladle lining life?

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Oakville, Ont., and Montreal

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
REG. U. S. PAT. OFF.

REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U. S. A.

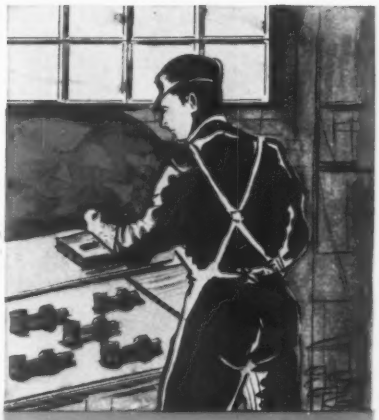
IN THE COMPLETE LINE OF

DELTA

CORE OILS, RESINS & BINDERS

THERE IS A PRODUCT..OR PRODUCTS TO GIVE YOU

EXACTLY WHAT YOU WANT!



MORE GREEN STRENGTH

HIGHER HOT STRENGTH

FASTER BAKING

BETTER COLLAPSIBILITY

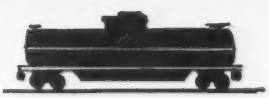
LOWER COSTS

UNIFORM QUALITY

You name it!

Tell us the result you want. We'll send a sample to you for test purposes. You'll soon learn the multiple advantages of using Delta Core Compounds.

DEPENDABLE DELIVERIES



..IN TANK CARS

..IN TRANSPORTS

..IN DRUMS

Be sure to visit our booth, No. 302, at the AFS 64th Castings Congress in Philadelphia, May 9-13.

OUR 27TH YEAR

DELTA

GOOD TO THE CORE

DELTA OIL PRODUCTS CORP. • MILWAUKEE 9, WIS.

MANUFACTURERS OF
SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

Circle 568 on Page 53

GET THE FACTS.... visit our booths 1638 and 1539 at the Foundry Show

Now..... MODERNIZE YOUR FOUNDRY PRACTICES with Sutter Automatic Equipment

Whether your foundry is large or small, your production runs long or short . . . you can have modern, automatic core and mold production for a surprisingly modest investment in Sutter equipment.

Fully automatic cycles on these machines assure high production and consistent quality, even with unskilled operators. Every unit is designed for maximum safety and minimum operator effort. The equipment is versatile . . . quickly adapted to production changes.

Sutter automatic equipment puts modern foundry practices and more profitable operations within your reach . . . and the first step is to call in a Sutter engineer!

Circle 569 on Page 53

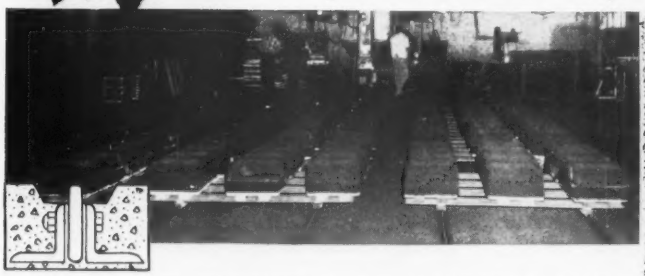
SUTTER PRODUCTS COMPANY

407 HADLEY STREET
HOLLY, MICHIGAN
P.O. BOX 38 TELEPHONE MElrose 7-7241

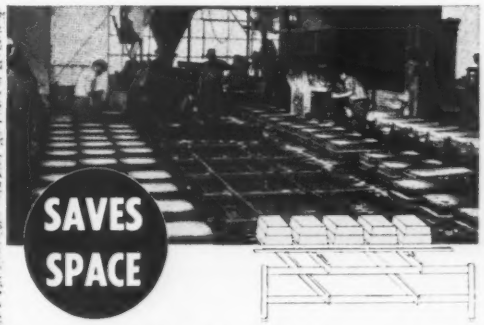
MODERNIZE . . . and COMPETE!

NOMAD EQUIPMENT helps you produce more molds per day! Each man-hour is more productive because molds are no longer carried away by the molder. Instead, molds "roll away" smoothly, without vibration on track conveyors.

THERE'S AN *ADDED* VALUE BUILT INTO NOMAD EQUIPMENT . . . It's the great number of track and equipment combinations which are possible. There's a conveyor system to fit your needs!

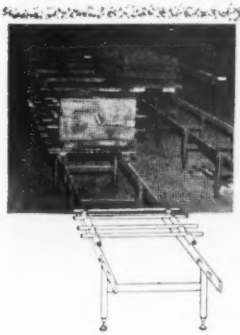


NOMAD RECESSED CONVEYORS give great flexibility to jobbing operations or to foundries which pour once a day. It is especially useful for short or long runs and cope and drag or squeezer jobs. Also, the whole area can be worked freely by a front-end loader.



SAVES SPACE

NOMAD DOUBLE LEVEL TRACK provides 2 conveyors in the place of 1 and EXPANSION without requiring new building facilities! The top track is used for storage and pouring. Empty pallets return and are stored on the bottom track until needed. Productivity is increased greatly by installing a pallet raiser and mold dump to each line.

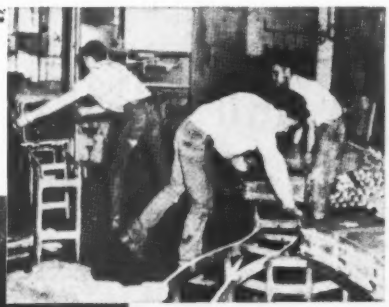


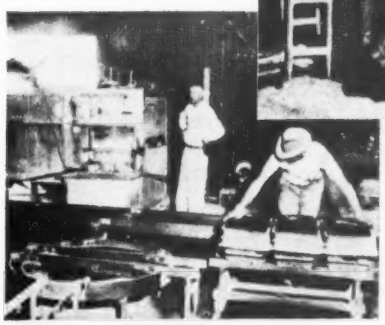
THERE'S LOW COST MODERNIZATION with Nomad Single Track Conveyors. It requires a minimum amount of space and accommodates both bottom boards or pallets. COMPLETE MOBILITY is possible by adding switches, transfer cars, turntables and curves.

ONE MAN HANDLES THE DUMPING FOR THE *ENTIRE* FOUNDRY!

Nomad's mold dumps are simply designed and sturdily built for fast dumping and effortless operation. The stationary, gravity type (above) serves a single mold line. Movable dumps ride on transfer track to serve SEVERAL lines.

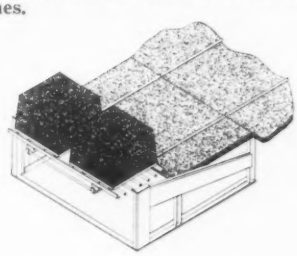
AUXILIARY EQUIPMENT "CUTS CORNERS"





You'll conserve valuable floor space, achieve highly flexible layouts by using curves, switches, turntables and transfer cars.

SAVES MOLDERS' TIME AND ENERGY!



Pallet raisers are used at the molder's end of Double Level Track to raise pallets into position to receive molds.

See our *NEW* SHAKEOUT-PUNCHOUT UNIT for handling tight flasks —

BOOTH 1137-39

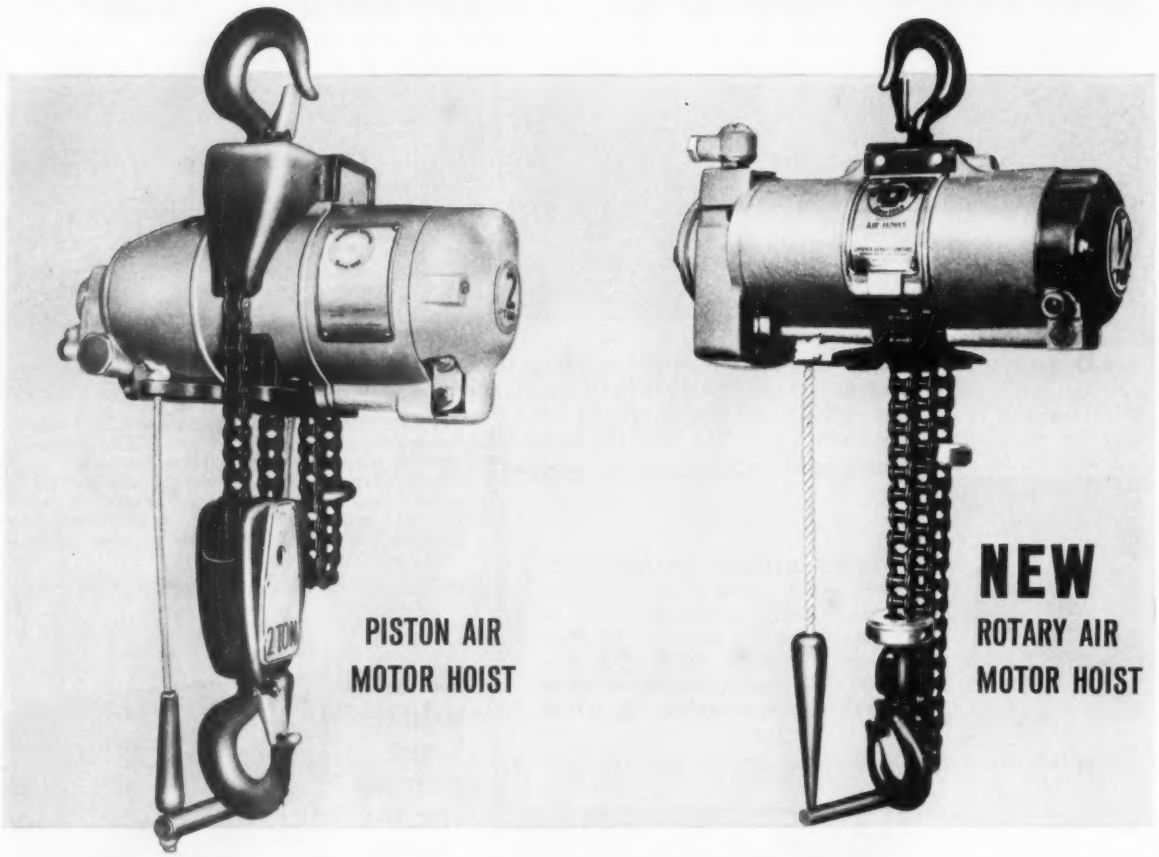
MUSCLES

A.F.S. Convention
Philadelphia, Pa.
May 9 to 13

NOMAD EQUIPMENT CORPORATION
3110 W. FOND DU LAC AVE., MILWAUKEE 10, WIS.
Designers and Manufacturers of Complete Conveyor Systems

NOMAD EQUIPMENT

WORK HORSE...RACE HORSE



GARDNER-DENVER PISTON AND ROTARY AIR HOISTS

Only Gardner-Denver offers lightweight overhead air hoists for *both* the "work horse" and "race horse" jobs. Axial-piston hoists provide rugged, dependable operation with the control demanded for precise spotting. That's why hundreds of industrial plants rely on this Gardner-Denver hoist. New rotary air hoists are designed for use where the combination of speed and ruggedness is of primary importance—up to 90 fpm in 500-lb. capacity.

Popular models available from 150-4000 lb. Sparkproof construction and pendent control available.

PISTON HOISTS			
MODEL	CAPACITY	SPEED	WEIGHT
86-1V10	1000	19	28
86-2V20	2000	19	78
86-2V40	4000	10	100

ROTARY HOISTS			
MODEL	CAPACITY	SPEED	WEIGHT
86R-5	500	90	27
86R-10	1000	40	27
86R-20	2000	20	30

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

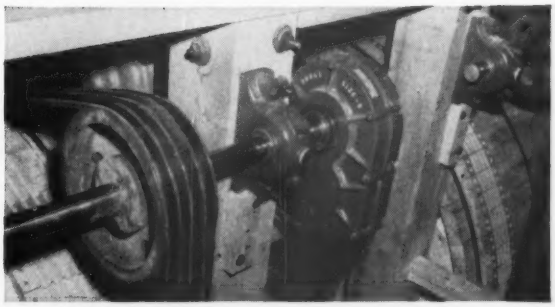
GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

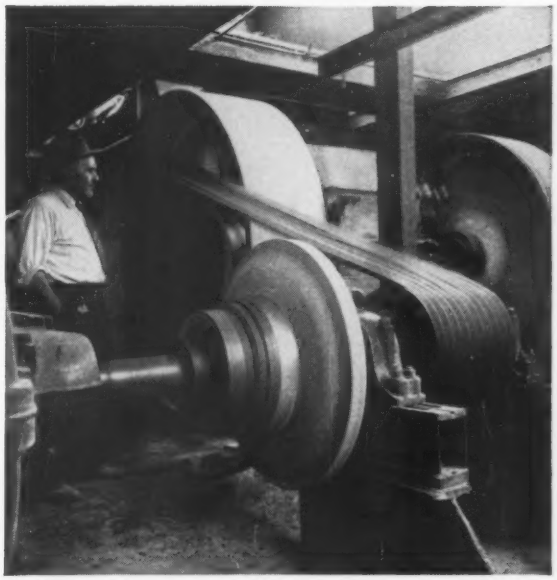
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

Circle 571 on Page 53

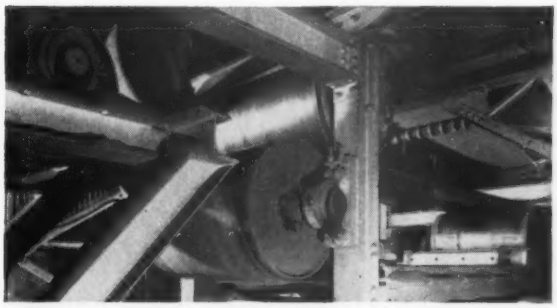
How Dodge pillow blocks with Timken® bearings give longer life with less maintenance



1. Two 2 7/16" Dodge Special Duty pillow blocks equipped with Timken® tapered roller bearings, support the line shaft driving six by eight foot tanning drums. The tapered design of Timken bearings enables them to take both radial and thrust loads in any combination.



2. The crusher at a trap rock and asphalt plant runs faster, gives more production now that Dodge Double Interlock pillow blocks on Timken bearings are installed. The Timken bearings in these blocks give full-line contact between rollers and races for greater load carrying capacity.



3. The Timken bearings in All-Steel Dodge pillow blocks must stand up under adverse operating conditions found when sintering metals. One major advantage of Timken tapered roller bearings is their ability to hold housings and shafts concentric, thus keeping lubricant in, dirt and dust out.

The photo at right shows the Dodge All-Steel pillow block Timken bearing equipped. The specially designed bearing has a tapered bore with self-aligning spherical outer surface—never needs adjustment.

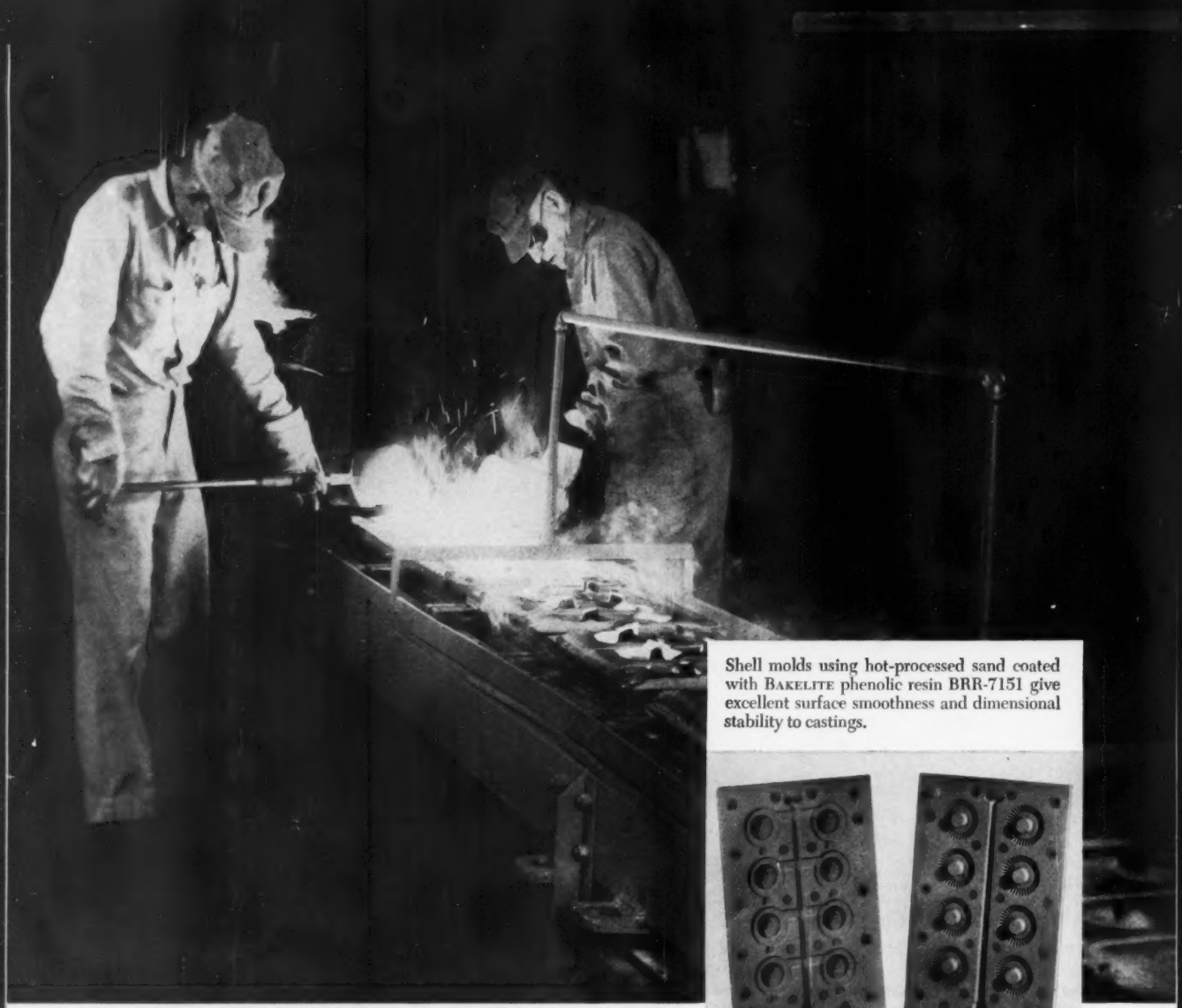
There's a Dodge pillow block equipped with Timken bearings to fill every engineering need: All-Steel, Type "E", Double-Interlock, Type "C" and Special Duty. And with Timken bearings, space consuming thrust devices are not needed. Look for Timken bearings in all the machines you buy or build. They're the symbol of quality. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

BETTER-NESS rolls on

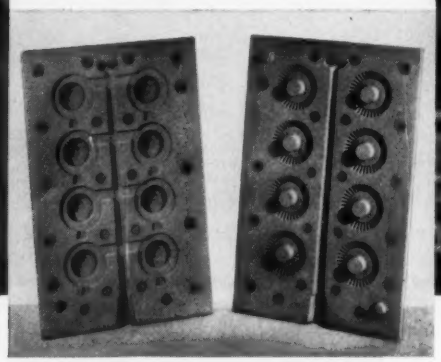
TIMKEN®

tapered roller bearings

Circle 572 on Page 53



Shell molds using hot-processed sand coated with BAKELITE phenolic resin BRR-7151 give excellent surface smoothness and dimensional stability to castings.



for faster production of shell-molded castings . . .

HOT-MIX WITH NEW BAKELITE BRAND PHENOLIC RESIN BRR-7151

Since its introduction six months ago, more and more foundrymen are using NEW BAKELITE phenolic resin BRR-7151 for hot processed coated sand. It gives greater production of castings from shell molds and cores and very often a smaller amount of resin is required.

Developed especially for rapid coating of hot sand, BAKELITE phenolic resin BRR-7151 flows around the sand faster thus reducing mixing time. It is a stable novalac, ideal for all types of hot coating equipment. BRR-7151 provides optimum flow for higher shell and core strength, ideal weight pick-up in rapid investment cycles, and optimum green strength on pattern plates. Castings with excellent dimensional stability and surface smoothness are produced.

Union Carbide Plastics Company produces a wide range of top-performing shell molding resins. Technical Service based on expert know-how and many years of experience is offered to foundrymen. For further details, contact the Union Carbide Plastics Company office near you, or write Dept. AF-52, Union Carbide Plastics Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

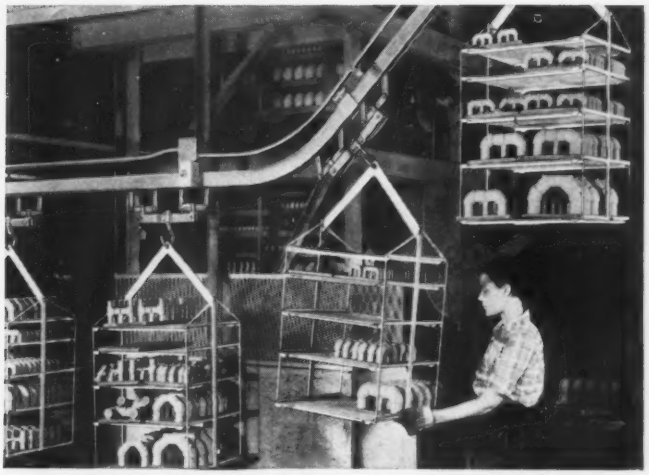
UNION CARBIDE

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

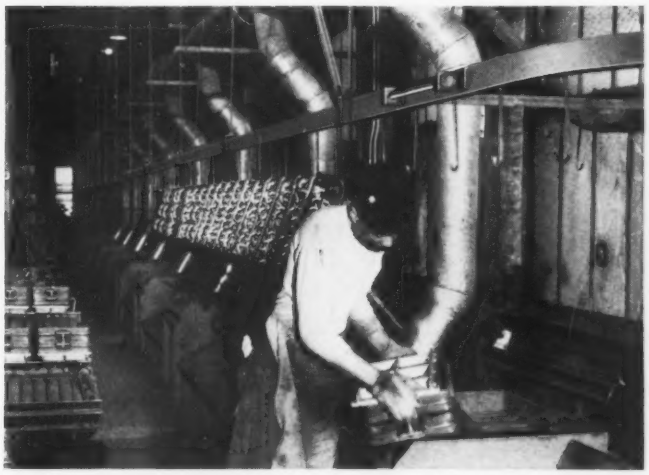
Circle 573 on Page 53

CONVEY CORES & CASTINGS OVERHEAD ...SWIFTLY SAFELY & ECONOMICALLY WITH R-W "Zig-Zag"

CONTINUOUS POWER CONVEYORS



Cores may be efficiently moved to and from the baking ovens and then on to checking benches via an R-W "ZIG-ZAG" Conveyor. Eliminates hazardous lifting and danger of costly breakage.



R-W "ZIG-ZAG" Conveyors provide a cost, space time saving way to move die castings from the casting operation through cleaning, grinding and checking stations and on to shipping. Smooth continuous product flow speeds-up production; eliminates costly bottle-necks.

Speed-up production, cut handling costs, eliminate breakage and increase profits with an R-W "ZIG-ZAG" Conveyor. Unit loads of up to 125 lbs. are carried up, down, in, out and around at a speed to meet your particular requirement. They are strong, flexible, efficient and safe... all moving parts of the chain are fully enclosed and protected from dirt and dust. "ZIG-ZAG" conveyors are economical to purchase... economical to operate and maintain... economical to install. May be installed and later expanded or altered by plant personnel. Write today... request Catalog A-93R.

FOR FAST, SAFE LADLE HANDLING

Reduce handling costs safely and speed-up production with R-W Crane and Monorail Conveyor Systems. Whether you need a single unit for a specific job or a complete system, R-W cranes and Monorail Conveyors provide smooth, safe ladle handling plus 100% utilization of the pouring area. Transfer cranes with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. Let an R-W Sales-Engineer show you how R-W equipment can save you time, money and maintenance costs. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

466 W. THIRD STREET, AURORA, ILL. Branches in Principal Cities

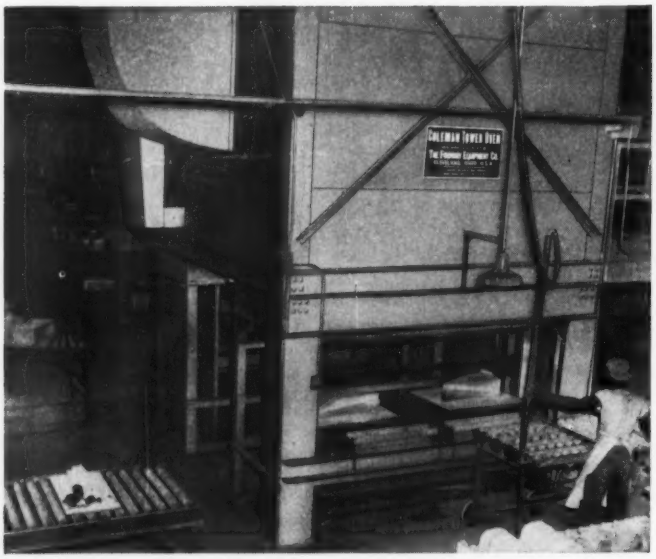
Circle 574 on Page 53

CUT LABOR COSTS

with

Coleman Dielectric Core Oven in leading plumbing fixture foundry. Direct labor alone reduced by 75%, with many other important savings and advantages.

Coleman Conveyor Core Ovens



Coleman Tower® Core Oven. One of two large installations in a major steel foundry. Mechanized handling and baking of cores up to 150 pounds at substantial annual savings.

● **Performance records in all types of foundries prove that Coleman Conveyor Core Ovens reduce core department costs by as much as 50%!**

Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.

As builders of the world's only complete line of foundry ovens . . . dielectric or recirculating heat . . . we can recommend, without bias, the right oven for your particular needs.

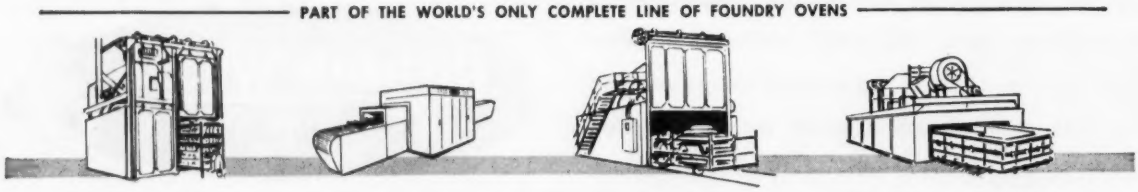
WRITE FOR BULLETIN 54

See us at the A. F. S. Show — Booth 1128

THE FOUNDRY EQUIPMENT COMPANY • **1821 COLUMBUS ROAD, CLEVELAND 13, OHIO**

World's Oldest and Largest Foundry Oven Specialists—More than half a century of specialized foundry experience.

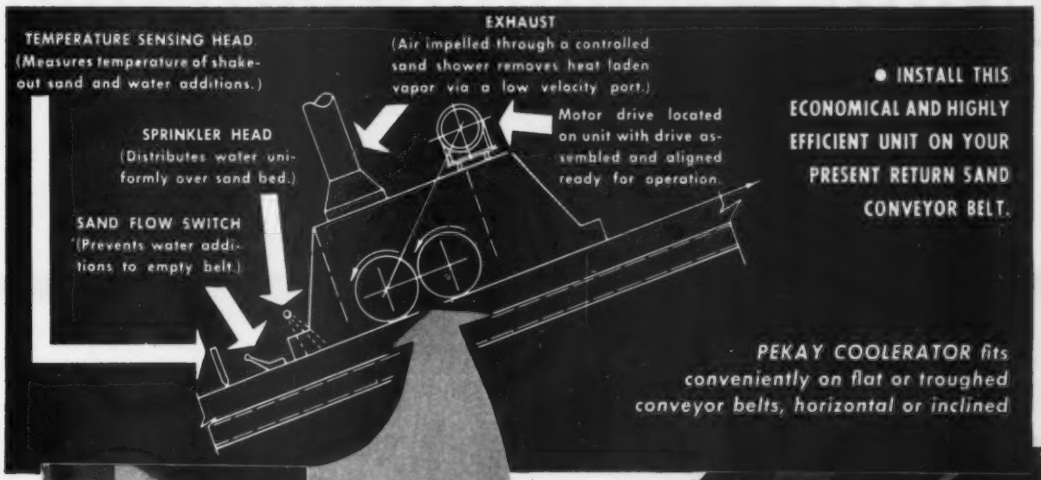
PART OF THE WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS



TRANSRACK OVENS **DIELECTRIC CORE OVENS** **CAR TYPE OVENS** **JET ACTION MOLD OVENS**

NOW!

YOU CAN ELIMINATE THE HOT SAND PROBLEM IN YOUR FOUNDRY—WITH THE PEKAY COOLERATOR WHICH WILL EFFECTIVELY COOL MORE SAND PER DOLLAR INVESTED


TEMPERATURE SENSING HEAD
(Measures temperature of shake-out sand and water additions.)
EXHAUST
(Air impelled through a controlled sand shower removes heat laden vapor via a low velocity port.)
SPRINKLER HEAD
(Distributes water uniformly over sand bed.)
Motor drive located on unit with drive assembled and aligned ready for operation.
SAND FLOW SWITCH
(Prevents water additions to empty belt.)

• INSTALL THIS ECONOMICAL AND HIGHLY EFFICIENT UNIT ON YOUR PRESENT RETURN SAND CONVEYOR BELT.

PEKAY COOLERATOR fits conveniently on flat or troughed conveyor belts, horizontal or inclined

MIXING
(Rapidly revolving cutter wheels break all lumps, thoroughly, aerate and distribute moisture throughout sand.)

The **PEKAY COOLERATOR** installation at **CLARK EQUIPMENT COMPANY'S** Steel Foundry, Buchanan, Michigan, cools return sand from a peak of 250° F to 115° F at the rate of 60 T. P. H.

BENEFICIAL FEATURES OF THE PEKAY COOLERATOR

- ***Rapid sand cooling without retention time*** • ***Reduce mixing time in mill***
- ***Insure closer sand quality control*** • ***Increase conveyor belt life***
- ***Simplicity of installation*** • ***Low operating and maintenance cost***

CUSTOMER SATISFACTION GUARANTEED

PEKAY MACHINE & ENGINEERING CO. INC.

869 N. SANGAMON STREET **CHICAGO 22, ILLINOIS**

Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____ CITY AND STATE_____

I would like information on:

☐ Pekay Mixer Mullers ☐ Pekay Coolerator
☐ Pekay Sand Systems ☐ Pekay Airators
☐ Pekay M-T-Matic Buckets ☐ Pekay Positive Mold Counters

"See us at the Foundry Show Booth No. 1123."

For every foundry—best news in years!

Norton Resinoid Wheels

Norton Foundry News

NORTON

BETTER SNAGGING WHEELS!

B11 resinoid bond gives wheels more uniform structure and better balance, assuring faster, cooler grinding, plus smoother operation. B11 wheels are available in sizes, types and half-grade increments of hardness for all jobs — on your swing frame grinders and floor stands down to the smallest portables.

BN and BNA straight wheels, reinforced with glass cloth, are strong and safe, excellent for cutting and notching gates and risers. Made in thinnesses down to 1/16″ and 3/32″.

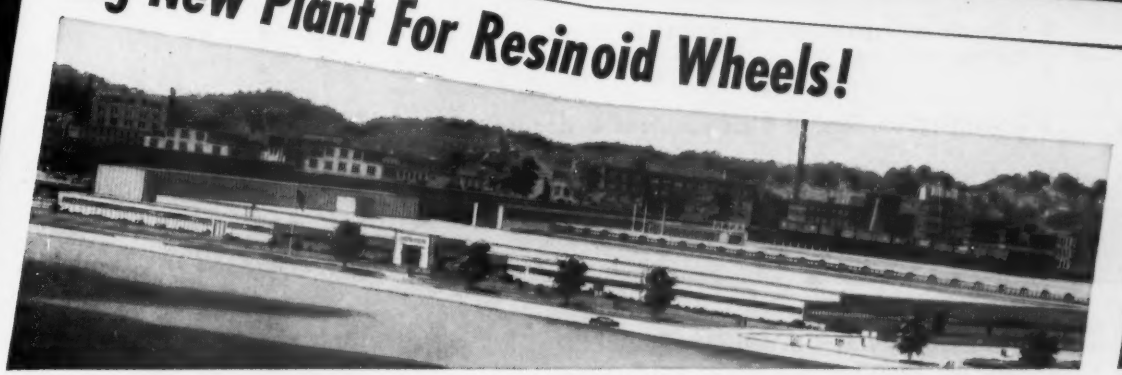
BD and BDA wheels, raised hub type, glass-nylon reinforced, are ideal for a wide job range — smoothing casting surfaces, cleaning between teeth of large gear castings, many slotting and cutting operations.

Better Quality Control!

Now Better Than Ever

Newest modern plant — designed and equipped to improve the wheels foundries need most — now going strong!

Big New Plant For Resinoid Wheels!



Plant No. 8, the newest Norton building in Worcester, is a good deal more than another regular step in the steady expansion of Norton manufacturing space.

This ultra-modern, multi-million dollar plant was built specifically to improve the manufacture and performance of resinoid wheels — the wheels foundries need most and use most.

Working equipment is up-to-the-minute in every detail. In-line production, now in full swing runs as smoothly and accurately as clockwork. Quality control, always a key factor in Norton leadership, is now as thorough as latest processing development can make it. New Plant No. 8 and its new resinoid wheels are the latest proof of how Norton maintains "Touch of Gold" performance at highest efficiency.

The better the processing, the better the performance. That's why every Norton resinoid wheel removes more metal per dollar throughout longer service life.

Small Cup Wheels . . . Lots of Safety

Built-in reinforcement is available in Norton cup wheels of standard size 6/4 3/4 x 2". The new steel cup bushing, molded firmly into the wheel back, does not replace a wheelguard but does provide additional safety — another valuable feature of Norton portable wheels that do more work with less operator-fatigue.

On-the-job reports of how Norton resinoid wheels are paying off in ferrous and non-ferrous foundries are in the new report, Norton High Speed Resinoid Wheels for the Foundry, shown here. Your copy is available from your local Norton Representative . . . and is as near as your phone. Call for it today. NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

NORTON
ABRASIVES

W-1966

75 years of . . . Making better products . . . to make your products better

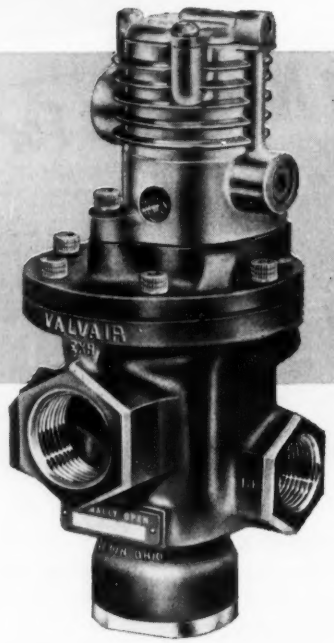
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 577 on Page 53

split-second response!
more work per hour!

with Valvair® HI-SPEED INLINE VALVES

- **solenoid coil guaranteed against burn-out for life of valve**
- **instant-action control • air-cushioned poppet**
- **multi-million cycle dependability • JIC pilot**



HI-SPEED INLINE with integral pilot, 2- or 3-way, NO or NC, 3/8 to 1 1/4 in. NPT.

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

For increased production . . . lower costs . . . greater safety . . . specify Valvair HI-SPEED INLINE valves.

Write for free Bulletin HIN. Address: Valvair Corporation, Akron 9, Ohio, Dept. FO-560.

See them at Booth 1107, The Foundry Show, Philadelphia, May 9-13.

Valvair AKRON 11, OHIO

Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio.

8110-3

Circle 578 on Page 53

Late News

BUSINESS PLATEAU: Latest report of the Business Survey Committee of the National Association of Purchasing Agents shows general agreement with economists who are predicting a business plateau this year. They feel that business will be good, but not booming. PAs generally will try to hold forward commitments to the minimum necessary to meet current production schedules, rather than to build inventories. This policy is based on three factors: 1. Ready availability of all materials. 2. Belief that prices will not rise in the months ahead. 3. High cost of carrying material in stock.

MORE DIECASTINGS: Optimism is the keynote of the yearly review of the American Die Casting Institute, national association of jobbing diecasters, which predicts that 1960 diecasting production should equal or surpass previous record highs. During 1959, zinc and aluminum diecasting production rose about 29 per cent over 1958.

AFS DIRECTOR: E. Claude Jeter, manufacturing manager of foundries, Ford Motor Co., Dearborn, Mich., has been named a director of American Foundrymen's Society. He replaces Louis J. Pedicini, Lester B. Knight & Associates, Chicago, who has resigned.

MILL CASTINGS: Even though the level of activity in the steel industry in the second quarter is expected to be considerably below the record first-quarter rate, the mills' orders for maintenance and repair castings have been riding an uptrend, undoubtedly because inventories were reduced to a minimum. On

Foundry Statistics

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1957	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Nov.	4,803,615	700,704	74,382	691,078
11 mo.	45,269,076	6,963,476	740,795	6,439,947
Dec.	4,973,670	761,494	80,593	712,779
Total	50,242,746	7,725,970	821,388	7,152,726
1959				
Jan.	5,375,042	783,045	86,519	767,289
Feb.	5,657,873	791,137	88,326	801,692
Mar.	6,677,499	873,982	101,986	965,048
Apr.	6,644,905	911,313	106,972	996,126
May	6,642,572	868,661	99,256	1,029,573
June	6,322,404	885,497	104,683	997,921
July	3,584,931	750,208	87,441	603,726
Aug.	1,875,165	691,786	81,184	374,678
Sept.	2,114,015	801,588	99,090	441,134
Oct.	2,266,709	798,569	98,279	445,137
Nov.	4,796,896	814,233	82,784	801,555
11 mo.	51,976,011	8,770,019	1,056,520	8,223,879

Index of Foundry Equipment Orders

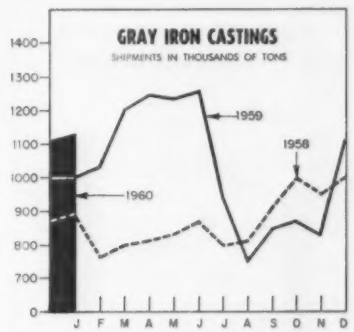
Foundry Trades Only

(Net Orders Closed, New Equipment)

	1959	1960
Jan.	127.4	95.5
Feb.	237.1	128.6
Mar.	166.6	....
Apr.	154.2	....
May	157.0	....
June	125.1	....
July	110.7	....
Aug.	134.1	....
Sept.	131.3	....
Oct.	140.8	....
Nov.	131.2	....
Dec.	95.9	....

Note: Base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.



GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings — Total	All Castings — For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Nodular Iron Castings Total	Heavy Steel Ingot Molds Total	Chilled Railroad Car Wheels Total	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[2]
1958	10,371,232	5,863,154	6,155,378	2,657,197	117,588	1,884,396	265,114	1,277,685	788,659	.....
1959										
Jan.	1,001,771	517,390	625,604	250,161	12,061	214,985	27,650	75,571	58,056	687,245
Feb.	1,036,655	538,514	642,882	252,115	12,619	230,706	31,035	76,147	55,885	767,360
Mar.	1,205,572	666,034	701,527	286,692	13,881	270,293	35,820	106,131	89,801	846,937
Apr.	1,245,702	688,755	726,105	295,982	14,663	270,476	35,655	129,861	83,605	892,214
May	1,236,250	685,285	706,073	285,507	16,003	275,563	36,960	141,675	75,979	884,779
June	1,252,016	717,067	707,291	295,064	15,510	268,479	30,723	160,540	84,983	836,707
July	932,713	532,912	599,422	252,915	14,508	99,670	20,486	133,175	79,960	897,536
Aug.	743,564	506,756	485,444	254,232	11,046	13,482	18,479	145,353	80,306	872,993
Sept.	850,043	528,145	595,435	279,357	11,875	19,416	16,272	142,660	76,260	843,278
Oct.	871,779	520,322	622,599	277,927	17,797	20,155	19,647	139,716	69,662	886,979
Nov.	831,504	516,032	493,508	250,342	12,698	165,139	16,723	96,886	60,048	885,368
Dec.	1,107,741	584,516	650,145	271,221	14,651	294,129	20,595	92,139	60,733	845,575
Total	12,315,310	7,001,728	7,556,035	3,251,515	167,312	2,142,493	310,045	1,441,553	865,278	.....
1960										
Jan.	1,136,793	593,022	678,610	278,318	16,795	295,994	18,463	86,798	56,928	852,336

*Source: U. S. Dept. of Interior Bureau of Mines. [1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

Late News

the other hand, rollmakers and ingot mold producers can expect their second-quarter orders to parallel the expected drop in steel industry operations.

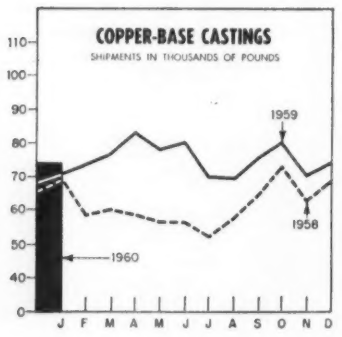
EXECUTIVE RESERVE MEETS: Members of the National Defense Executive Reserve will be briefed on the latest developments in nonmilitary defense at a two-day training conference, May 23-24, in Washington, D. C. Foundry industry representatives will be Richard A. Brackett, Spencer Turbine Co., Hartford, Conn.; Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh; Leslie L. Andrus, Wheelabrator Corp., Mishawaka, Ind.; and William L. West, Torit Mfg. Co., St. Paul.

TREND IS UP: Several industries related to castings production show upturns in their latest reports. Dollar volume of material handling equipment orders in February jumped nearly 14 points over the January figure, to 128.74 on the Material Handling Institute index (1954 monthly average equals 100). Foundry equipment orders rose to 128.6, or about one-third over the December and January levels (1947-49 monthly average equals 100), in February on the Foundry Equipment Manufacturers Association index. Finally, primary aluminum production in March increased almost 14,000 tons over February, to 170,658 tons, or only 8500 tons under the record month, July, 1959.

NFA MOVES: Offices of the National Foundry Association have been moved from 53 W. Jackson Blvd., Chicago, to a new building at 4321 St. Charles Rd., Bellwood, Ill. Bellwood is about 12 miles due west of Chicago's Loop.

PERSONALS: John T. Hegner has been appointed president and treasurer, Sterling National Industries Inc., Milwaukee, succeeding Richard A. Smith, who has become board chairman. Norman L. Schmeichel, executive vice president, also was appointed secretary, and Melvin P. Pederson has become assistant treasurer as well as assistant secretary . . . Charles F. Seelbach Jr. has been elected president and general manager, Forest City Foundries Co., Cleveland. Other officers are Charles F. Seelbach Sr., board chairman; William F.

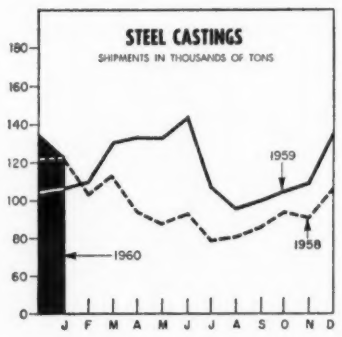
Foundry Statistics



COPPER-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mold	Unfilled Orders[2]
1958	762,484	697,360	31,854	.....
1959				
Jan.	70,123	62,266	3,753	25,344
Feb.	72,754	64,558	4,007	26,468
Mar.	78,641	69,472	4,333	29,373
Apr.	82,799	73,567	4,640	29,941
May	78,413	69,351	4,363	27,074
June	79,366	70,512	4,421	30,389
July	69,073	61,650	3,869	31,820
Aug.	68,979	60,346	4,410	32,117
Sept.	75,739	66,211	4,809	29,396
Oct.	79,832	69,583	5,172	28,092
Nov.	70,674	61,490	4,893	29,147
Dec.	73,558	64,579	4,337	29,243
Total	899,951	793,585	53,007	.....
1960				
Jan.	73,971	65,742	3,915	26,053



STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings			Carbon			Alloy			
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Unfilled Orders[2]
1958	1,121,000	856,986	149,644	801,846	606,240	136,251	319,154	250,746	13,393	.....
1959										
Jan.	105,392	82,683	14,408	76,242	59,023	12,948	29,150	23,656	1,460	232,646
Feb.	110,280	86,013	14,686	79,365	61,261	13,316	30,645	24,752	1,370	245,096
Mar.	131,317	103,848	20,086	93,309	75,968	18,410	35,008	27,880	1,676	270,682
Apr.	134,344	104,890	21,372	99,295	76,802	19,761	35,049	28,088	1,611	271,613
May	135,359	105,804	23,825	101,504	78,767	22,498	33,855	27,037	1,327	263,969
June	143,624	111,725	26,567	107,000	82,485	24,568	36,624	29,240	1,999	248,782
July	106,448	83,540	16,007	77,990	60,501	14,520	28,458	23,039	1,487	274,065
Aug.	98,914	79,188	17,607	74,825	60,243	16,373	23,189	18,945	1,234	279,261
Sept.	99,731	79,963	13,975	73,648	58,453	12,830	26,083	21,510	1,145	256,871
Oct.	105,570	84,850	11,819	80,127	63,901	10,978	25,443	20,108	841	268,874
Nov.	109,460	86,026	11,764	77,320	59,294	10,799	29,305	26,732	965	301,858
Dec.	133,346	104,138	18,868	99,643	77,517	17,200	33,703	26,621	1,668	306,346
Total	1,412,885	1,112,668	110,984	1,040,268	814,219	194,201	366,512	297,608	16,783	.....
1960										
Jan.	122,565	94,052	22,106	93,197	70,815	20,891	29,368	23,237	1,125	314,237

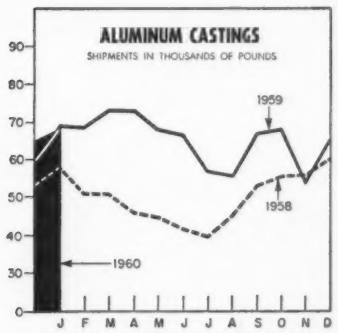
[1]Source: Bureau of the Census. [2]For sale only.

Seelbach, first vice president; Ralph G. Wieland, second vice president, and Walter Kremser, secretary-treasurer . . . Charles E. Brust has retired as president of Eastern Malleable Iron Co., Naugatuck, Conn. He has been succeeded by Malcolm Baldridge, and William H. Canwell has been named a vice president . . . R. C. O'Kane has been made president and general manager, Buckeye Steel Castings Co., Columbus, Ohio, succeeding F. H. Bonnet, who becomes board chairman. Other new officers include W. W. Heimberger, vice president-operations and G. T. Johnson Jr., vice president-sales.

OBITUARY: William M. Duncan, 87, former president, Duncan Foundry & Machine Works, Alton, Ill., died April 11 . . . Charles Beckett, 71, founder and owner of Beckett Bronze Co., Muncie, Ind., died Feb. 17.

TEAM FOR JAPAN: The International Co-operation Administration has appointed Edward C. Hoenicke, former general manager, Foundry Div., Eaton Mfg. Co., Vassar, Mich., and past president, Foundry Educational Foundation, to be project manager for a team of industrial consultants to the welding, forging, industrial instrumentation, and gray iron foundry industries in Japan. Itinerary assignments in Japan include Tokyo, Nagoya, Kobe, Osaka, Kyoto, and Yokohama.

MISCELLANY: Loeffelholz Co., 104-year-old Milwaukee nonferrous foundry, has been purchased by John H. Van Dyke . . . National Malleable & Steel Castings Co., Cleveland, will purchase Hill, Hubbell Div., General Pacific Corp., San Francisco, for about $3 million, subject to the approval of General Pacific shareholders. Hill, Hubbell applies protection to steel pipe in the form of coatings, coatings-and-wrappings, and inner linings to prevent corrosion . . . Sunset Foundry Co., Kent, Wash., has been licensed to use the Parlanti (Niforge) Mould Process in the field of aluminum and aluminum alloys . . . Dracco Div., Fuller Co., Cleveland, has begun construction of an 18,000 sq ft addition to its main plant which will raise total plant area to more than 85,000 sq ft . . . American Hoist & Derrick Co., St. Paul, has acquired Industrial Brownhoist Corp., Bay City, Mich., and will operate it as a wholly owned subsidiary.



PRODUCTION WORKERS

Estimated Number

	Jan. 1960	Dec. 1959	Jan. 1959
Ferrous	197,600	197,600	180,500
Nonferrous	55,500	55,200	51,200

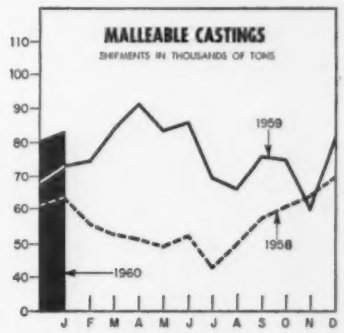
Average Weekly Earnings

Gray Iron	$100.37	$99.47	$93.14
Malleable Iron	100.45	97.77	92.75
Steel	100.49	99.45	100.00
Nonferrous	103.16	102.92	98.16

Average Weekly Hours

Gray Iron	40.8	40.6	39.3
Malleable Iron	41.0	40.4	39.3
Steel	39.1	39.0	40.0
Nonferrous	41.1	41.5	40.9

Source: Bureau of Labor Statistics.



ALUMINUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1958	641,700	125,487	224,092	290,275	.....
1959					
Jan.	68,896	11,238	24,844	32,813	83,314
Feb.	68,381	10,802	25,428	32,147	82,001
Mar.	73,351	12,412	26,964	33,949	82,676
Apr.	72,976	12,700	26,153	33,992	85,636
May	68,268	11,979	25,283	30,877	80,325
June	66,479	12,312	24,927	29,092	81,228
July	56,911	11,581	20,410	24,786	80,450
Aug.	55,904	11,130	17,824	26,818	82,488
Sept.	66,193	12,309	21,506	32,239	81,839
Oct.	67,499	12,958	21,781	32,640	78,930
Nov.	54,557	10,813	16,326	27,303	84,392
Dec.	65,069	12,409	20,078	32,463	86,947
Total	784,474	141,503	273,814	371,428	.....
1960					
Jan.	68,496	11,269	22,368	34,722	92,548

[1]Source: Bureau of the Census. [2]For sale only.

MALLEABLE IRON CASTINGS

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Standard—Total	Standard—For Sale	Pearlitic—Total	Pearlitic—For Sale	Unfilled Orders[2]
1958	660,659	383,839	540,600	313,597	120,059	70,242	.....
1959							
Jan.	73,186	43,667	56,700	35,139	16,486	8,528	77,322
Feb.	74,760	42,093	57,573	31,976	17,187	10,117	90,291
Mar.	84,335	49,590	67,439	40,515	16,896	9,175	95,822
Apr.	90,974	54,306	75,583	43,835	18,391	10,471	102,506
May	83,472	49,619	66,512	40,438	16,960	9,181	99,879
June	85,497	51,411	68,426	42,453	17,071	8,958	95,339
July	69,184	43,128	55,120	35,787	14,064	7,341	75,252
Aug.	65,062	40,143	53,217	33,224	11,845	6,919	85,852
Sept.	76,063	46,469	60,209	36,619	15,854	9,850	82,274
Oct.	75,511	48,625	61,683	40,088	13,828	8,537	85,031
Nov.	58,258	42,235	48,951	33,981	9,307	8,254	82,555
Dec.	80,060	45,917	61,455	35,891	18,605	10,026	93,874
Total	889,476	557,273	732,868	449,946	186,494	107,357	.....
1960							
Jan.	83,188	46,154	63,637	35,933	19,551	10,221	100,302

Prices of Foundry Metals and Coke

(As of April 25, 1960)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$18.00-18.50

OVENS

Birmingham	$30.35
Buffalo	32.00
Detroit	32.00
Erie, Pa.	32.00
Indianapolis	31.25
Kearny, N. J.	31.25
Milwaukee	32.00
Neville Island (Pittsburgh)	30.75
New England, deld.	33.55
New Haven, Conn.	31.00
Painesville, O.	32.00
Philadelphia	31.00
St. Louis	33.00
St. Paul	31.25
Swedeland, Pa.	31.00
Terre Haute, Ind.	31.25

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	Nom.	Nom.
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 34.00; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy, 25.00-25.25. Deoxidizing grades; No. 1, 25.50; No. 4, 22.75.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 33.00, delivered Connecticut valley.

ZINC: High grade 14.25, delivered. Die casting alloy No. 3, 16.50; No. 2, 17.00, delivered.

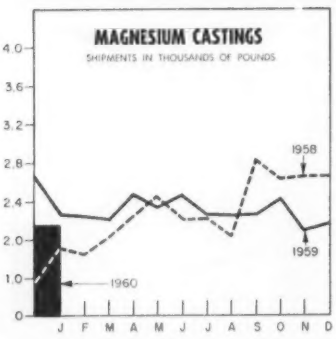
Iron and Steel Scrap

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$31.00-32.00	$48.00-49.00	.....	.....	.....	.....	$50.00-51.00
Boston*	**26.00-27.00	**39.00-40.00	.....	.....	**40.00-42.00	.....	.....
Buffalo	30.00-31.00	**45.00-46.00	.....	.....	**49.00-50.00	.....	50.00-51.00
Chicago	32.00-33.00	45.00-46.00	.....	53.00-54.00	53.00-54.00	52.00-53.00	52.00-54.00
Cincinnati*	**31.50-32.50	**40.00-41.00	**36.00-37.00	.....	**51.00-52.00	.....	54.00-55.00
Cleveland	33.00-34.00	49.00-50.00	35.00-36.00	52.00-53.00	54.00-55.00	49.00-50.00	56.00-58.00
Detroit*	**28.00-29.00	**40.00-41.00	**34.00-35.00	**47.00-48.00	.....	.....	.....
Los Angeles	33.00	44.00	.....	.....	.....	.....	.....
New York*	31.00-32.00	37.00-38.00	34.00-35.00	.....	.....	.....	.....
Philadelphia	35.00	41.00	43.00	.....	51.00-52.00	55.00-56.00	.....
Pittsburgh	34.00-35.00	42.00-43.00	.....	47.00-48.00	51.00-52.00	.....	59.00-61.00
St. Louis*	33.00	48.00	40.00	48.00	.....	.....	46.00
San Francisco	34.00	44.00	28.00	40.00	40.00	.....	.....
Seattle	32.00	30.00	25.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Foundry Statistics



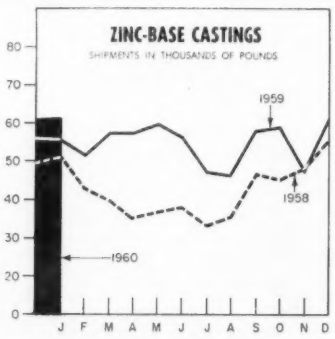
PIG IRON

PRODUCTION—Net Tons**

	Foundry	Malleable & Silvery	Low & Int. Low Phos. & Bessemer
1958	1,622,320	2,448,917	4,954,854
1959			
Jan.	190,392	263,105	479,019
Feb.	121,716	258,250	312,284
Mar.	173,881	341,218	412,533
April	159,950	296,384	427,227
May	198,126	358,087	474,820
June	188,158	346,231	441,052
July	166,378	173,760	258,935
Aug.	N.A.	N.A.	N.A.
Sept.	N.A.	N.A.	N.A.
Oct.	N.A.	N.A.	N.A.
Nov.	148,660	180,927	216,063
Dec.	177,017	306,303	452,426
Totals[3]	1,341,572	2,607,339	536,688
1960			
Jan.	128,232	325,151	462,667
Feb.	148,238	338,866	471,755
Total	276,470	664,017	934,422

CONSUMPTION*—Gross Tons

	Cupola	Air	Electric
1957	4,160,891	218,178	246,851
1958			
Nov.	287,013	14,862	31,397
11 mo.	2,992,911	152,657	205,695
Dec.	321,741	16,610	25,450
Total	3,314,652	169,267	231,145
1959			
Jan.	321,302	17,113	36,783
Feb.	324,876	17,960	37,414
Mar.	353,985	20,625	42,464
Apr.	366,378	21,997	41,597
May	358,192	20,424	40,812
June	366,136	20,390	39,867
July	311,327	16,391	20,437
Aug.	288,547	15,937	4,923
Sept.	336,015	18,057	6,033
Oct.	351,679	20,011	5,749
Nov.	276,168	16,350	28,231
11 mo.	3,654,605	205,255	304,310



ZINC-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	590,071	409,471	.....
1959			
Jan.	55,439	38,661	61,192
Feb.	51,368	35,478	57,437
Mar.	57,600	40,700	62,657
Apr.	57,325	40,127	55,916
May	60,656	43,920	62,224
June	56,128	40,226	54,097
July	46,756	34,606	52,677
Aug.	46,566	34,682	56,090
Sept.	58,144	40,397	60,953
Oct.	59,214	42,594	57,814
Nov.	46,720	37,410	58,076
Dec.	60,606	39,516	65,723
Total	656,520	468,317	.....
1960			
Jan.	61,399	39,639	65,092

MAGNESIUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	28,776	25,024	.....
1959			
Jan.	2,291	2,086	5,001
Feb.	2,249	1,995	4,637
Mar.	2,129	1,924	4,465
Apr.	2,455	2,213	4,787
May	2,370	2,093	5,102
June	2,484	3,207	4,664
July	2,265	1,875	3,995
Aug.	2,243	1,753	3,809
Sept.	2,263	1,832	3,823
Oct.	2,436	1,890	3,501
Nov.	2,023	1,628	3,281
Dec.	2,163	1,731	3,423
Total	27,371	24,227	.....
1960			
Jan.	2,163	1,616	3,223

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

Drop by Drop . . . IN 1959
FOUNDRYMEN USED
241 TONS OF
LYQUAGRIP*

READY-TO-USE CORE PASTE

FOR THESE 12 ADVANTAGES

1. Unsurpassed for pasting CO^2 cores

2. Ready mixed, uniform at all times

3. Light colored, odorless, non-corrosive, non-fermenting

4. Dries rapidly at room temperatures

5. Unaffected by normal storage

6. Will not boil or blister

7. No appreciable gas generation

8. Pasted joints are stronger than core

9. Unaffected by mold humidity

10. Extra strong, uses 1/3 to 1/5 as much paste

11. Cores may be reheated without damaging pasted joints

12. Washes off hands and tools easily with warm water

Ask for literature or consult our representative

*Trade Mark Reg.

See us at Booth Nos. 316 and 413

Whitehead Brothers
COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
75 Westminster St., Providence 1, R. I.

Manufacturers of

LYQUAFLOUR
For cleaner surfaces, better shakeout

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The Liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

DUO RESIN
Binder for baking with controlled oven temperatures

CORE HARDENING TIME CUT

from 3 hours to 15 seconds*

...WITH PURECO CO_2 "FLASH CURING"

The Pureco CO_2 *Flash Curing* process can mean extensive savings in time and money to you. Hardening time is cut from hours to seconds . . . no costly baking ovens or core driers are needed . . . valuable space is saved . . . more accurate castings with smoother finish result. Mold drying is eliminated . . . rapid production of finished cores expedite rush orders. In-plant handling time is drastically reduced.

For production or custom work.

Pureco can tailor a *Flash Curing* installation to meet your specific foundry requirements —large or small. Cost is low—installation simple.

Have a trial Flash Curing demonstration.

Pureco would like to demonstrate its *Flash Curing* process in *your foundry* under *your working conditions*, with no obligation on your part. Call your local Pureco man or write:

**Actual Pureco test*

VISIT OUR BOOTH 1233

PURECO CO_2

PURE CARBONIC

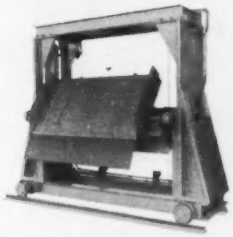
Pure Carbonic Company, A Division of Air Reduction Company, Incorporated
Nation-Wide Pureco CO_2 Service-Distributing Stations in Principal Cities
General Offices: 150 East 42nd Street, New York 17, N.Y.

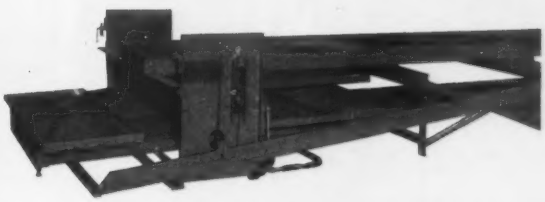
AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

SEE . . . PROOF OF Newaygo's LEADERSHIP IN FOUNDRY AUTOMATION

at the Foundry Show, May 9 - 13 in Philadelphia

OUR OPERATING EXHIBIT *will show these pallet mold handling system components* **IN ACTION** **at Booth Nos. 1606-8-10 and 1507-9-11!**

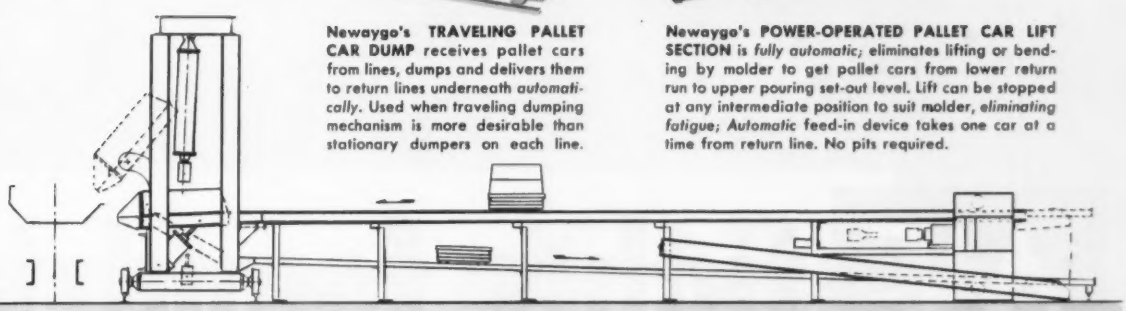




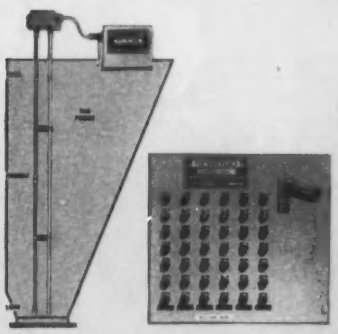
Pallet Line with Traveling Dump and Power Lift

Newaygo's TRAVELING PALLET CAR DUMP receives pallet cars from lines, dumps and delivers them to return lines underneath *automatically*. Used when traveling dumping mechanism is more desirable than stationary dumpers on each line.

Newaygo's POWER-OPERATED PALLET CAR LIFT SECTION is *fully automatic;* eliminates lifting or bending by molder to get pallet cars from lower return run to upper pouring set-out level. Lift can be stopped at any intermediate position to suit molder, *eliminating fatigue; Automatic* feed-in device takes one car at a time from return line. No pits required.

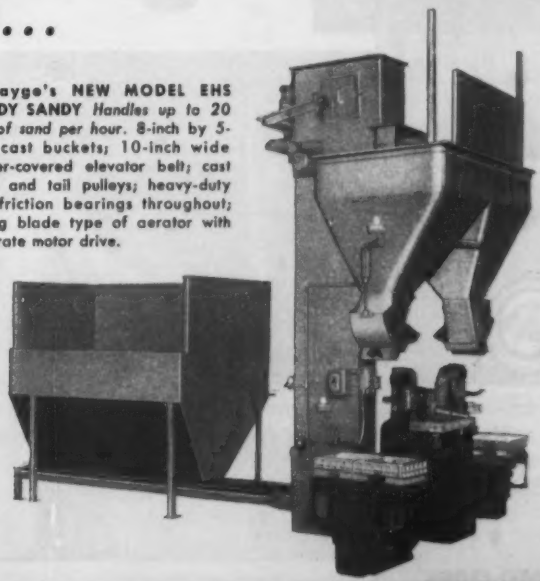


PLUS . . . *AND . . .*



Newaygo's NEW MULTI-LEVEL CONTROL for Automatic Sand Distribution and Hopper Filling. Assures a continuous supply of sand to molders by *automatic* sand distribution. This NEW system reports and controls 3 or more levels of sand in hoppers or bins!

Newaygo's NEW MODEL EHS HANDY SANDY *Handles up to 20 tons of sand per hour.* 8-inch by 5-inch cast buckets; 10-inch wide rubber-covered elevator belt; cast head and tail pulleys; heavy-duty anti-friction bearings throughout; cutting blade type of aerator with separate motor drive.



See Two Newaygo MOVIES: "Progressive Mechanization" on TUESDAY, MAY 10; and "Pallet Systems of Mold Handling" on THURSDAY, MAY 12, at the Convention Hall Theatres.

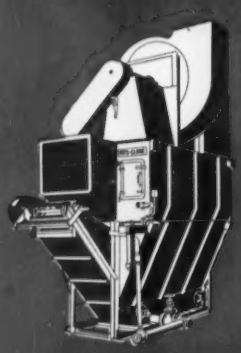
NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable, too, with **NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT**

Also Manufacturers and Installers of MULTI-LEVEL HOPPER CONTROL SYSTEMS, CAR CONVEYORS, APRON CONVEYORS, ROTARY FEEDERS, and FOUNDRY AUTOMATION.

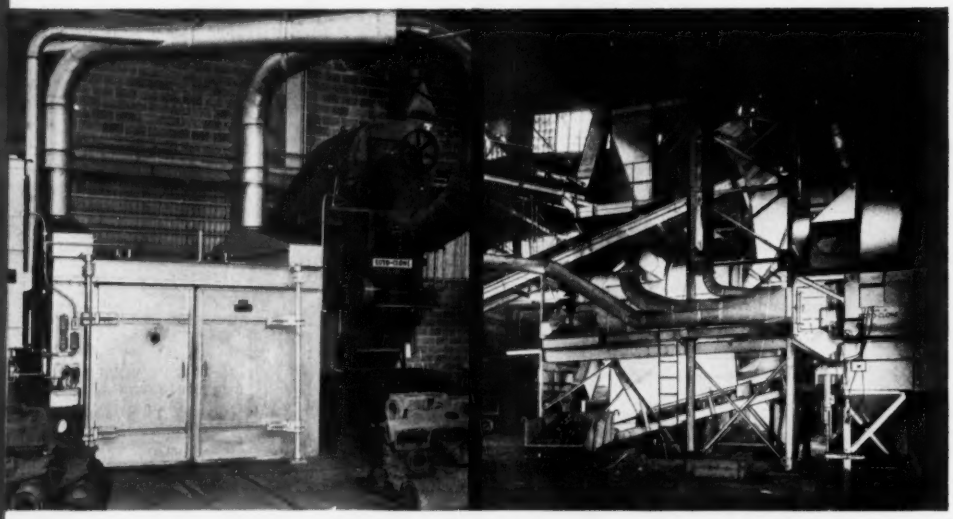
Better Air Is Our Business

Type N ROTO-CLONE



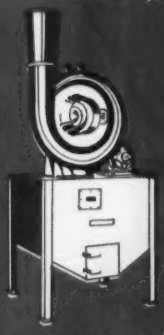
ABRASIVE CLEANING, SAND HANDLING

The Type N ROTO-CLONE is widely used for exhausting both abrasive cleaning (below left) and sand handling operations. High cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. Automatic sludge ejector provides for easy disposal of collected material. Bulletin 272.



AAF fights foundry

GRINDING

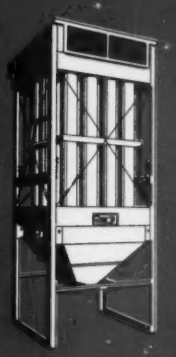


Type D ROTO-CLONE

The usual recommendation for snag, portable and swing frame grinding dust is the Type D ROTO-CLONE which combines exhauster and separator in a compact, self-contained unit. It draws in the dust-laden air, delivers the collected material to the storage hopper and expels the cleaned air —all in a single operation with only one moving part: the impeller. Bulletin 272.

High efficiency, low cost and small space requirements make AAF's Type W ROTO-CLONE a favorite for shakeout operations. Water sprays extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles. Requires little maintenance, uses a minimum of water and maintains efficiency regardless of variation in air volume. Bulletin 274.

AMERjet

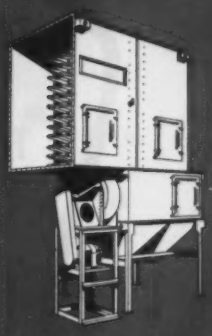


ELECTRIC MELTING FURNACE

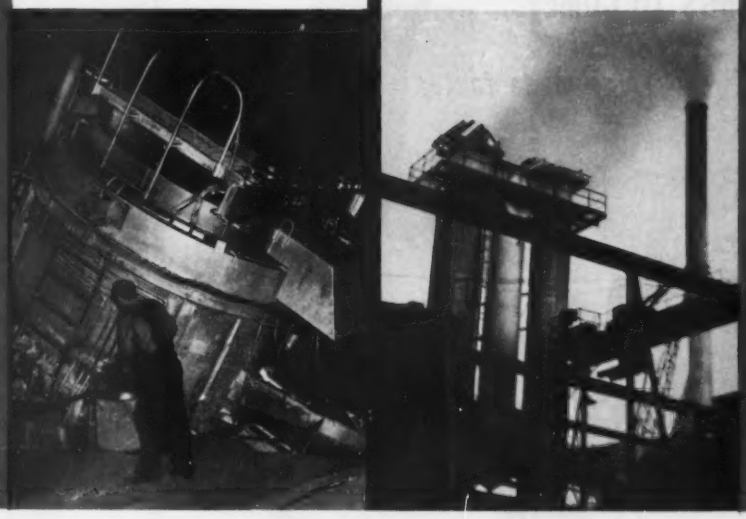
The AMERjet Fabric Dust Arrester is recommended for metallic fumes from electric melting furnaces. Reverse jet principle allows velocities through the cleaning media up to 5 times greater than ordinary fabric collectors. Constant air volume is assured by constant, automatic and continuous reconditioning of cleaning tubes. Bulletin 279.

AAF's AMERclone dry centrifugal, originally designed for boiler fly ash, is the answer to cupola stack gases. Not a cinder-catcher, the AMERclone traps the fine particles that often settle on parking lots and surrounding neighborhoods. One AMERclone handles two cupolas alternately, assuring full-time utilization of equipment. Bulletin 291.

AMERclone

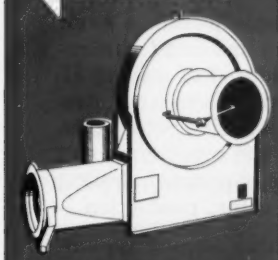


CUPOLA



dust on all fronts

SHAKEOUTS



Type W ROTO-CLONE

Where is process dust causing you trouble?

GRINDING? SHAKEOUTS?
ABRASIVE CLEANING? CUPOLAS?
SAND HANDLING? MELTING FURNACE?

Only a complete line of versatile dust control equipment can successfully fight the plant-wide battle against foundry dust. And the world's most complete line is AAF. It includes hydrostatic precipitators, dynamic precipitators, dry centrifugals and fabric arresters.

AAF's 20 years experience in foundry dust control assures the right unit for every dust-producing operation, regardless of type of dust or concentration. Every product in the line, what's more, offers the basic design features you expect from AAF:

- **Small space requirements**
- **Maintained performance over a wide range of operating conditions**
- **Constant exhaust volumes**
- **High collection efficiency**

Here they are—AAF's "stable of champions" for foundry dust control. One of them will answer *your* dust problem. For more information on any or all, call your local AAF representative or write direct. Address: Mr. Robert Moore, American Air Filter Company, Inc., 266 Central Avenue, Louisville, Kentucky.

®AAF herman nelson

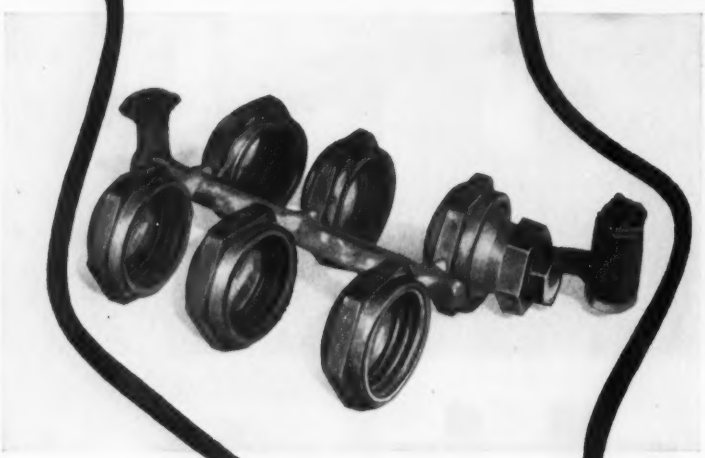
AAF American Air Filter
BETTER AIR IS OUR BUSINESS

See our display, Booths 934-936, Foundry Show.

Circle 582 on Page 53

THE SHAPE OF THINGS TO COME...

castings made faster and to critical tolerances



Typical castings from the Cardox CO_2 molding process. These blast furnace union nuts need only blast cleaning. At right, a union on sprue is screwed into nut.

CARDOX CO_2

SEMI-PRECISION MOLDING PROCESS

Close tolerances and savings in time are only two of the many advantages you gain with this new improvement in the CO_2 core hardening process. You also get smoother casting finish and achieve important savings in money.

For example, one company was able to shave the cost of producing a small casting from $1.07 before milling to only $.37. In addition, the same company to avoid milling had to maintain tolerances of only ± 0.029 in. Yet tests indicate that tolerances of as little as ± 0.005 in. can be held on small castings if it becomes necessary.

This has become possible even though full core and mold hardening has been reduced to only 10-12 seconds. This time has been cut even more in other foundries. Set-up time is reduced, too, and core storage and core dryers are eliminated, freeing more space for actual production.

Those companies already capitalizing on these advantages have found that production has been increased with little or no capital outlay for new equipment, and existing production methods have required no major change. The same could hold true for *your* foundry.

Contact your nearest Cardox representative and write for your copy of the illustrated case history, "CO_2 Core Handling Enables Two Pittsburgh Foundries to Improve Precision, Speed Production."

To Get The Most From Your CO_2 Process

CARDOX® CO_2- in any form, when you need it

Bulk Liquid Carbon Dioxide—ready for use at your plant. Cardox Storage Units, installed without capital investment on a "keep full" user contract basis, are supplied with CO_2 by Cardox' fleet of trucks and rail tank cars from over 60 plants and depots. You pay only for the CO_2 used, nothing for maintenance or up-keep. CO_2 cylinder gas, dry ice and converters also available.

SEE US AT THE FOUNDRY SHOW, BOOTH 1009, PHILADELPHIA, MAY 9-13

CARDOX DIVISION OF CHEMETRON CORPORATION
Dept. 431, 840 N. Michigan Ave., Chicago 11, Ill. CHEMETRON

REGIONAL OFFICES: Jersey City, N. J., 7th & Provost Sts. | Detroit, Mich., 1723 W. Lafayette Blvd. | Fort Worth, Texas, 825 N. Calhoun St. | Memphis, Tenn., 784 Mississippi St. | Chicago 9, Illinois, 43rd & Marshfield | Los Angeles, Calif., 151 North Avenue 19

CARDOX® PRODUCTS: Carbon Dioxide Fire Extinguishing Systems, Trucks, and Foam Fire Equipment . . . Liquid Carbon Dioxide . . . Carbonic Gas . . . Dry Ice

Circle 583 on Page 53

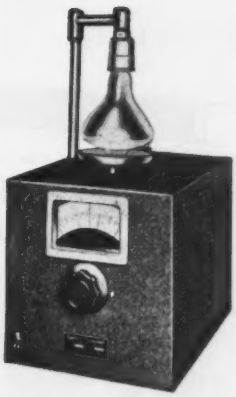
NOW

Sand Control

BY

TABOR

TRADE 1884 MARK



Moisture Tester

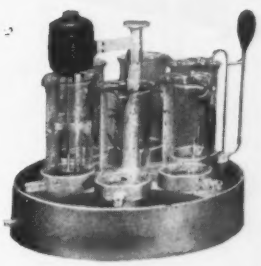
Utility Mixer

Permtester

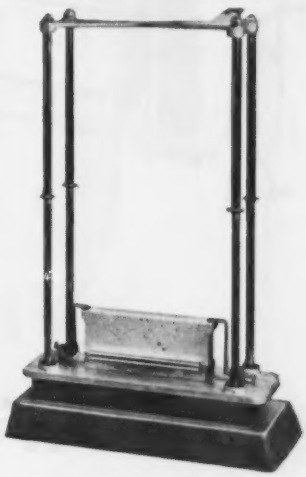
Standard Testing Sieves

Core Hardness Tester

Combination Rammer-Compression Tester



Sand Washer



Transverse Test Core Maker

Tabor Manufacturing Company, long dedicated to cutting foundry costs, proudly offers a complete line of sand control equipment. The equipment simplifies sand control procedures, while maintaining rigid control. Equipment designs are based on the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Association.

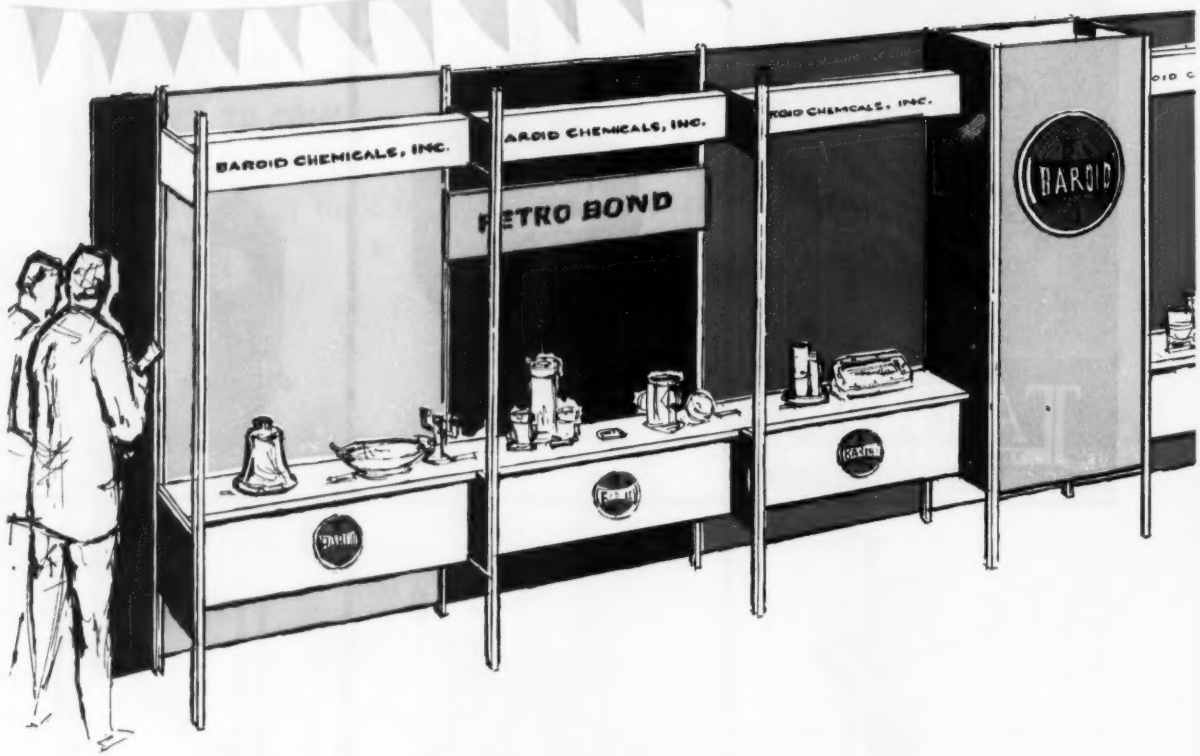
Tell your Tabor Representative about your sand control problems. He'll show you where procedures can be simplified to help you save time, reduce scrap, and improve production and quality of castings.

TABOR MANUFACTURING COMPANY

Division of Turbo Machine Company

Lansdale, Pa.

Stop at booth 928



Visit BAROID CHEMICALS at the AFS exposition . . .

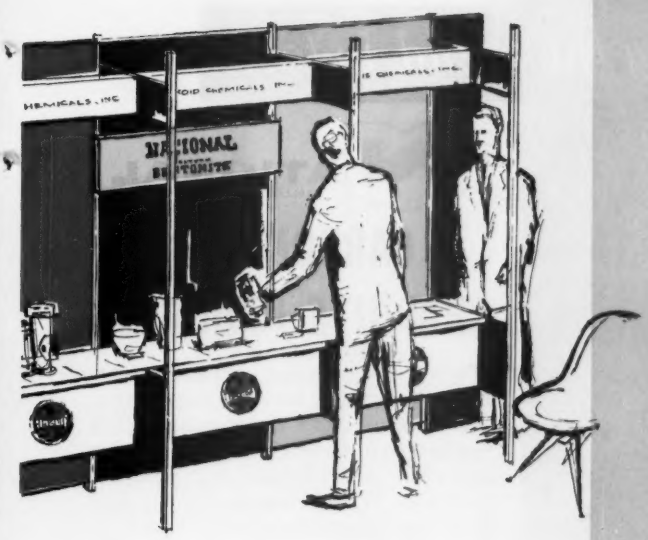
PETRO BOND* will be featured in an operating foundry at Baroid Chemicals' AFS Exhibit. You'll see the smoother finishes, the more faithful pattern reproduction obtainable with this outstanding sand-bonding agent.

PETRO BOND is a formulated sand-bonding agent used with oil instead of water. PETRO BOND produces precision castings with conventional foundry equipment. Castings are sounder . . . with less porosity . . . surfaces are denser, tolerances closer.

In addition to the operating foundry,

BAROID CHEMICALS, INC.
A SUBSIDIARY OF NATIONAL LEAD COMPANY

*Registered Trademark, National Lead Company



there will be a display of castings produced in PETRO BOND sand showing the wide utility of the product.

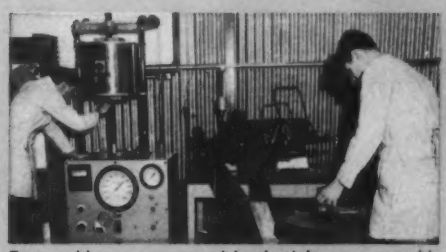
NATIONAL® Western Bentonite in molding sands produces fine finish castings of all metals – malleable iron, gray iron, steel, brass, aluminum or magnesium. NATIONAL Western makes better cores and high-refractory wash formulations. NATIONAL cores dry faster, have higher dry strength and contain less gas to vent.

Be sure to visit Baroid Chemicals' Exhibit at the 1960 AFS Castings Congress and Exposition in Philadelphia, May 9-13.

Better castings through BAROID RESEARCH

Research and testing at Baroid Chemicals' Houston Pilot Foundry is conducted to continuously improve known techniques while searching for new methods of making better molding sands. As a result, today's foundries have fewer rejects and produce smoother, more accurate castings.

Metal is melted in gas-fired, crucible-type furnace at Baroid Chemicals' Pilot Foundry.



Test molds are compacted in the jolt-squeeze molding machine at right. Thermolab for high temperature sand testing is at left.

Sand testing equipment includes, from left to right: sand rammer, universal strength machine, permeability tester.

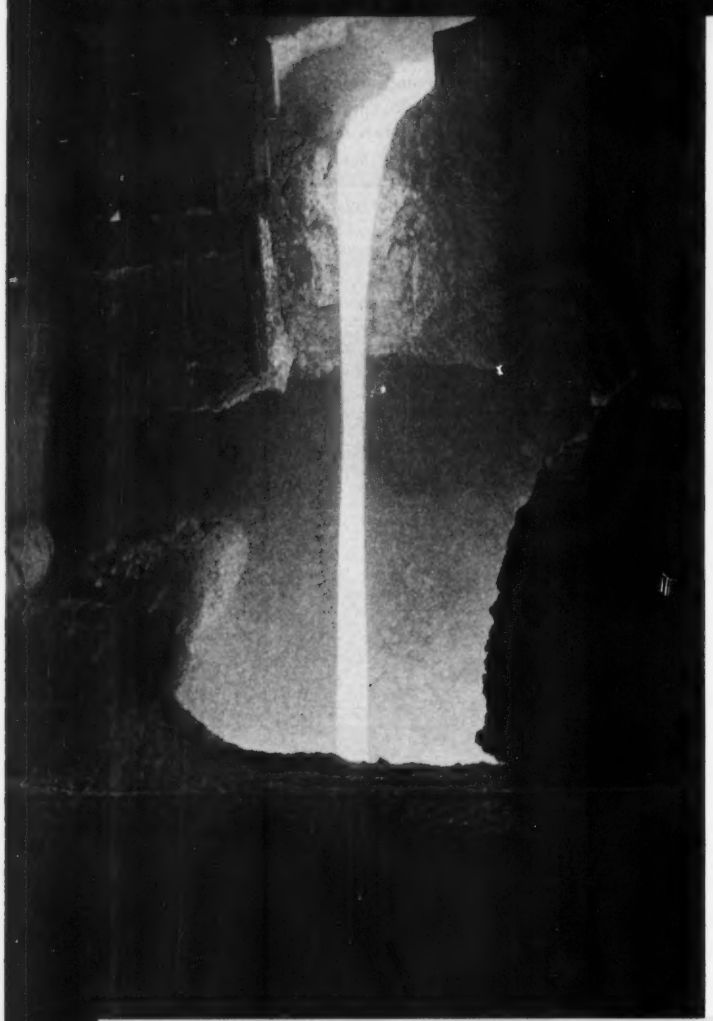
Air conditioned laboratory at Baroid Chemicals' Pilot Foundry is well equipped for research.

1809 SOUTH COAST BUILDING
HOUSTON 2, TEXAS

6058

Circle 585 on Page 53

In iron foundries today the trend is to...

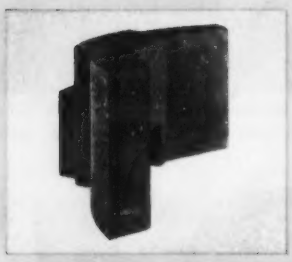


NATIONAL
TRADE-MARK

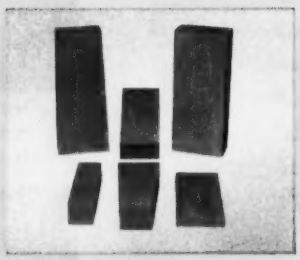
CARBON AND GRAPHITE PRODUCTS

When your operations require refractories to handle molten irons either inside or outside the cupola, you'll realize economic advantages when you use "National" carbon and graphite products. Why? Because carbon and graphite have no melting point... resist slag and thermal shock... are not wet by molten irons... have low thermal expansion... increase in strength with increase in temperature.

Whether you use carbon block and brick for lining cupolas and runout troughs... carbon paste for patching ... graphite tubes for injection and upgrading of iron... graphite plungers for producing ductile iron... or core rods and chill plates—you'll find these products all help reduce maintenance, speed production and lower overall costs. For details write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



CARBON BLOCKS—Provide long refractory life in the cupola.



CARBON BRICK AND PASTE—Proved materials for cupolas and runout troughs.

GRAPHITE TUBES—Unsurpassed for carburizing with graphite power and injection for upgrading.

"National" and "Union Carbide" are registered trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY

UNION CARBIDE

13½ ft clearance under bucket hinge makes it easy for Michigan to dump well over top of high truck sideboards.

How Michigan Tractor Shovel helps U. S. Steel save money on round-the-clock loading assignment

Combination in one machine of truck-like mobility, fast loading capacity, and exceptional dependability is helping save time and money for U. S. Steel at their Gary Works in Gary, Indiana.

This machine, a new Model 275A Michigan Tractor Shovel works fast . . . *four cubic yards per bucket bite!* It travels fast . . . *up to 28 mph.* And it's dependable!

The Michigan's most important assignment is loading stockpiled "breeze," a by-product of oven coke used to sinter iron ore for the blast furnace. Average 10 ton loads of this bulky material take the Model 275A only three passes, 90 seconds.

Bucket teeth speed loading out of wet or frozen stockpiles.

"A very versatile machine"

"We find lots of other things for the Michigan to do, too," says George Ihle, general foreman, Docks and Auxiliaries. "It digs, loads and carries almost anything.

"We've used it to clear snow from streets and parking lots.

"It has dug, backfilled and loaded out dirt and stone.

"It often loads coal—typical eight-hour output: twenty-five 55-ton capacity rail cars.

Loads heavy rice stone

"It also frequently loads rice stone—dolomite for use as flux in the open-hearth furnace. The dolomite is fed into 14-ton haul trucks or 55-ton center-dump rail cars. In a 24-hour period, this loading amounts to about 675 tons.

"Other Michigan work includes maintaining haul roads . . . building truck access roads up the side of giant ore stockpiles . . . clearing oversized and frozen chunks of ore and coke breeze from the grates over the sinter plant truck unloading station.

Takes place of pick-up truck

"Michigan has even been used to take the place of a pick-up truck—carrying tools, pumps and equipment to work crews in various parts of the mill area. Its big bucket, of course, has the capacity of a pick-up.

"One of the Michigan's greatest assets is versatility," concludes Mr. Ihle. "We sure like the way it takes on and speeds one job after the other."

Circle 587 on Page 53

Michigan is a registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK EQUIPMENT

2475 Pipestone Road
Benton Harbor 24, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

Just a small piece does a

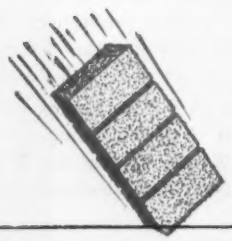
GREAT BIG JOB...

Famous

CORNELL CUPOLA FLUX

- **Makes Gray and Malleable Iron Cleaner**
- **Cuts Maintenance Costs on the Cupola**
- **Makes Your Iron More Easily Machined**

That's all it takes. A little Famous Cornell Cupola Flux added to each charge of iron purges the iron of impurities. For cleaner metal, slag floats and flows off. Write for Bulletin 46-B.



don't accept substitutes

IF you melt aluminum, copper or brass, try Famous Cornell Aluminum, Copper or Brass Flux. Write for Bulletin 46-A.

SEE US AT THE SHOW! BOOTH 1504

The CLEVELAND FLUX Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

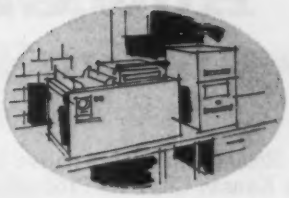
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

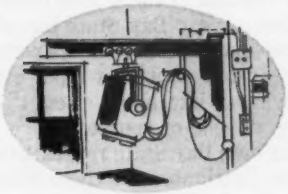
Trade Mark Registered

Nine different ways...

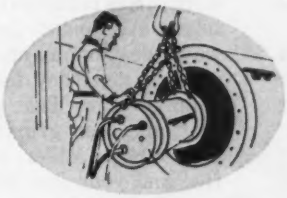
TVX
remote-inspection unit



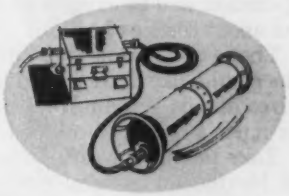
Xeroradiographic unit for
dry-process radiography



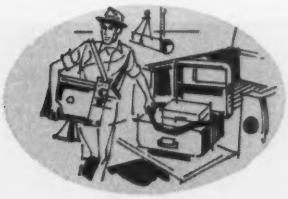
OX-250 general
utility x-ray unit



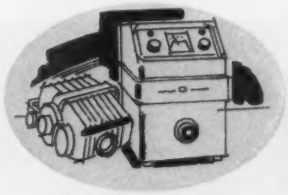
Resotron 300*—
300-kvp portable x-ray



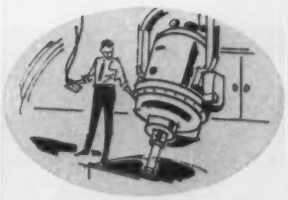
OX-175 — 175-kvp
portable x-ray



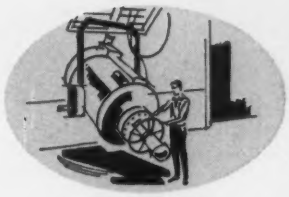
LX-140 — ultra-compact
portable x-ray



LC-90 lightweight
mobile x-ray



Resotron 1000*—
million-volt x-ray



Resotron 2000*—
2-million volt x-ray

to look at your products!

Let General Electric X-Ray lend a hand

G-E x-ray inspection equipment covers every need — with units available in power ranges from 5 to 2,000-kvp output . . . choice of wet or dry radiographic processing . . . even *remote-television* x-ray fluoroscopy. Production-line, continuous inspection can easily be arranged where desired.

There's no need at all to settle for piecemeal help when you want x-ray apparatus, supplies or installation-planning assistance. Instead, take advantage of the industrial x-ray experience General Electric has gained through half a century of serving needs and solving problems much like your own. You stand to come out ahead in many ways. Our specialists have the knowledge that can find right answers in a hurry. Our research facilities are set up to solve even the most unusual puzzles.

For assistance with your inspection problems, contact our office in your area, or just write X-Ray Department, General Electric Company, Milwaukee 1, Wisconsin, Room YY-54.

* REGD. T.M.

Progress Is Our Most Important Product

GENERAL ELECTRIC

How Gene Miller upped wheel

Roland Garlick is a native-born Yankee who lives in Kansas City. As Production Manager of Neville Foundry Co., Inc., one of the biggest jobbing outfits of its kind in the K. C. area, he's a shrewd and hard-headed analyst of time and cost factors in every operation, and he expects his suppliers to be as careful about costs as he is.

That's one reason why he's so well satisfied with the results Bay State Abrasive Specialist Gene Miller gives him on grinding wheels . . . because Miller is as much production-minded as he is sales-minded.

Take the silicon carbide wheels they were using at Neville for general clean-up grinding on small castings, for example. Miller knew it was a good wheel but figured a combination of two different abrasives might do an even better job. He suggested a Bay State formulation that included both silicon carbide and aluminum oxide with a special grit size combination and asked Garlick to try it out.

The result was a full 20% increase in wheel life at the same cutting speed and, on top of that, a worthwhile reduction in the cost of the wheels themselves. As Roland Garlick says: "Bay State has always been Johnny-on-the-spot from the service point of view and they look at our problems from *our* point of view. That's what I like about them . . . that, and their grinding wheels, of course."

Like Gene Miller, your own Bay State representative and your Bay State distributor are thoroughly experienced, highly trained abrasive specialists. *Better grinding at lower cost . . . that is their business.*

(*Above*) Operator Ernest Ford cleans up cast strainer bodies with Bay State's long-lasting combination aluminum oxide/silicon carbide wheel.

(*Right*) Neville Foundry's Production Manager, Roland Garlick, examines finished surfaces of relatively complex gas regulator castings with Bay State's Gene Miller.

life and cut wheel costs, too, at Neville Foundry

Bay State Abrasive Specialist Gene Miller has spent 10 years working on just about every conceivable abrasive problem that might be encountered by any foundry or metal working plant. Part of his experience included valuable training at the distributor level. It is this wide, yet concentrated, experience that makes him so outstandingly useful to his customers.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

Circle 590 on Page 53

Thinking of automation?

The Universal Mold Conveyor is typical Jeffrey automation equipment – moves molds on the level, up, down and around.

Jeffrey builds single units and/or builds the entire system

Your men work at elevations best suited to each operation, with the Jeffrey universal mold conveyor on the job. Their tasks are eased and manufacturing efficiency is maintained at high levels, helping to boost earnings.

Flow of such materials as sand, castings, coke, limestone and iron borings is handled by Jeffrey vibrating feeders and conveyors, electric or mechanical types. They may serve as cooling conveyors, carrying castings from shakeout, and even the most fragile castings are handled safely.

Jeffrey mechanizes the handling of sand; overhead belt conveyors distribute sand to molders' stations, carry it from shakeout to Jeffrey sand conditioning plant and back to molders. Catalog 911 describes all of this foundry equipment. For a copy, write The Jeffrey Manufacturing Company, 907 N. Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Use These Cards . . .

FOUNDRY

- For more information on anything advertised in this issue
- For further data on products described in the Equipment and Supplies section (Page 186)
- To get copies of publications listed in the Literature for Foundrymen section (Page 261)
- To request extra copies of editorial articles

FOUNDRY — MAY 1960

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
409	439	469	499	529	559	589	619	649	679	709	739	769	799	829	859
410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
422	452	482	512	542	572	602	632	662	692	722	752	782	812	842	872
423	453	483	513	543	573	603	633	663	693	723	753	783	813	843	873
424	454	484	514	544	574	604	634	664	694	724	754	784	814	844	874
425	455	485	515	545	575	605	635	665	695	725	755	785	815	845	875
426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

SEND COPIES OF FOLLOWING ARTICLES IN THIS ISSUE

Page No. — Title of Article

....

....

Circle item number for further information on anything described or advertised in this issue

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good until July 15, 1960

FOUNDRY — MAY 1960

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
409	439	469	499	529	559	589	619	649	679	709	739	769	799	829	859
410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
422	452	482	512	542	572	602	632	662	692	722	752	782	812	842	872
423	453	483	513	543	573	603	633	663	693	723	753	783	813	843	873
424	454	484	514	544	574	604	634	664	694	724	754	784	814	844	874
425	455	485	515	545	575	605	635	665	695	725	755	785	815	845	875
426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

SEND COPIES OF FOLLOWING ARTICLES IN THIS ISSUE

Page No. — Title of Article

....

....

Circle item number for further information on anything described or advertised in this issue

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good until July 15, 1960

FOUNDRY

Reader Information Service

Just mail one of these cards . . . for more information on anything advertised in this issue . . . for further data on products described in the Equipment and Supplies section (Page 186) . . . to get copies of publications listed in the Literature for Foundrymen section (Page 261) . . . to request extra copies of editorial articles.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States
—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States
—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

Whether furnace output is measured in grams or tons, Hevi-Duty's value solution pays steady operating dividends.

When you consult a Hevi-Duty Sales Engineer on any heat-processing problem, you take three important steps toward a sound solution. For Hevi-Duty helps you three ways:

Designs the system to fit your need. A Hevi-Duty Applications Engineer works full time on such problems. Call on him. He might save you countless hours. He may have solved a problem like yours last week.

Designs the furnace to fit the system. Usually, the unit you need will be a proven item, for you are drawing from the most complete line of heat-processing equipment in the business. If not, Hevi-Duty engineers can quickly design the unit that fits your needs exactly.

Builds the furnace to last. Hevi-Duty furnaces are built for tough, continuous production work. They are designed to last, and hundreds of case histories prove they do.

Here are three typical examples of non-ferrous melting furnaces spanning a wide range of sizes, yet each provides the value solution to a problem.

HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

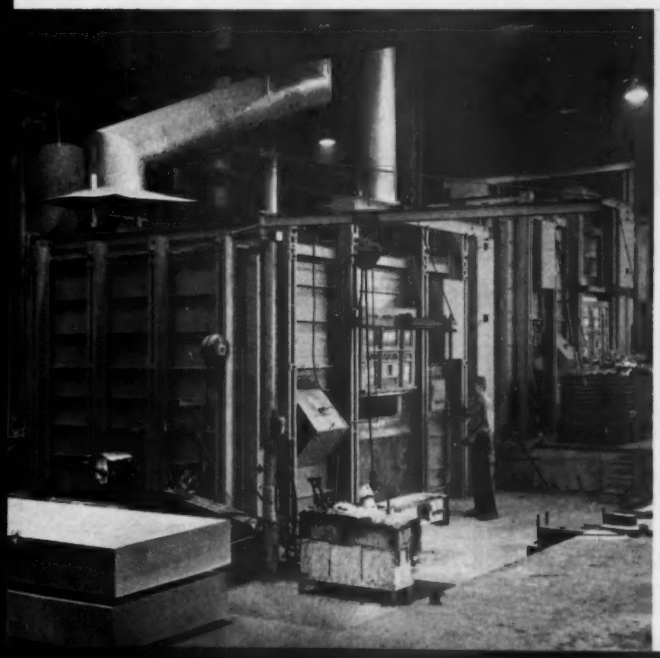
B P C

A Division of Basic Products Corporation

Hevi-Duty Electric Company, Milwaukee 1, Wis.

Wall Colmonoy Corp., Detroit, Michigan, uses this Hevi-Duty laboratory crucible furnace to find exact melting temperatures of hard-surfacing and brazing alloys. Furnace heats rapidly to the 2200° F. temperature required, provides precise control for melting and cooling tests on 250 g samples. User reports long element life at high temperatures. ***For more information, send for Bulletin 1246.***

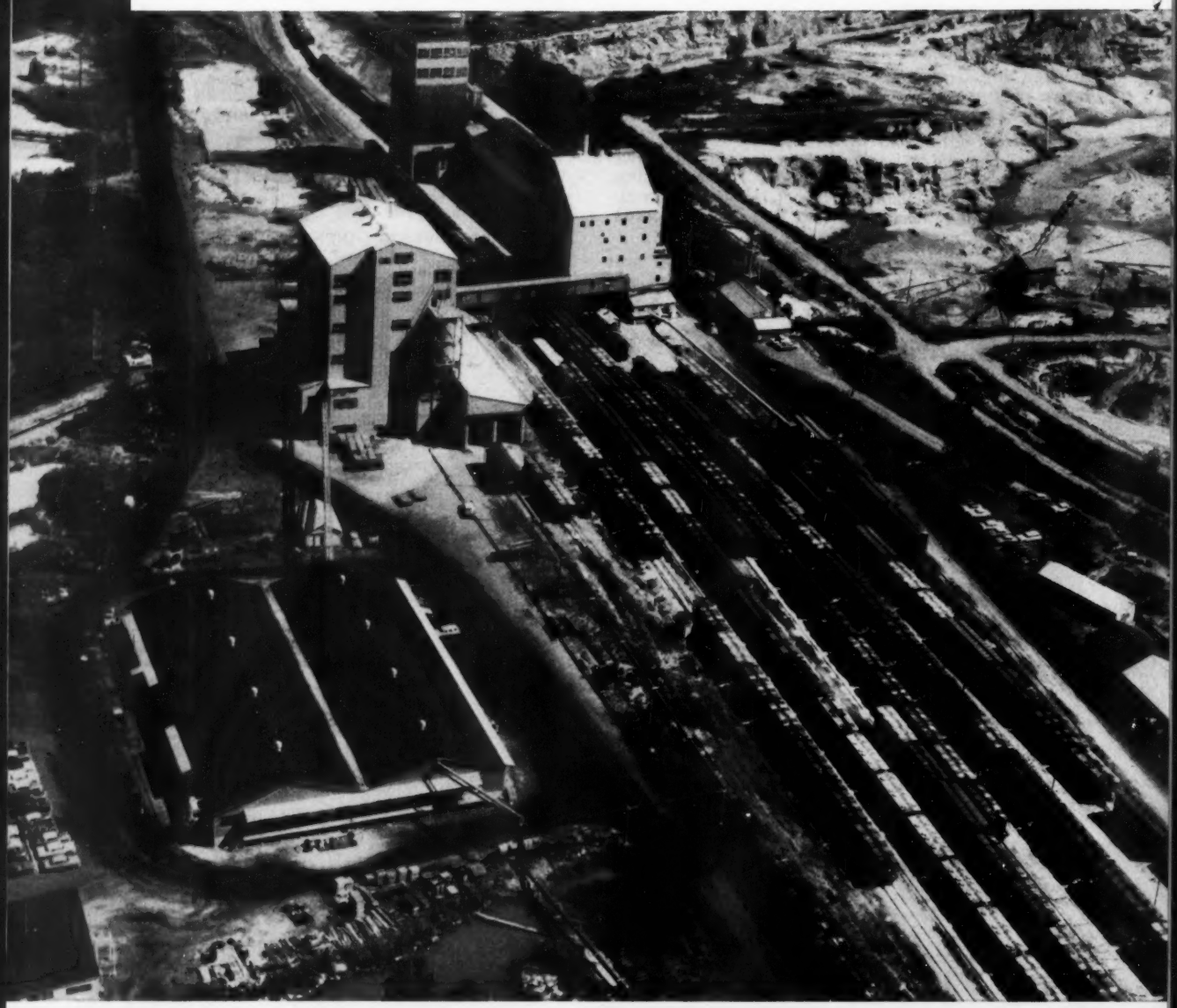
This Hevi-Duty double-chamber, dry-hearth furnace melts 100 lb of aluminum per hour, 16 hours a day, 7 days a week at Alliance Mfg. Co., Alliance, Ohio. It can provide up to 200-lb-per-hour output and occupies little space. It maintains critical bath temperatures during charging. User states: "You can turn it on and forget about it." ***For complete information, send for Bulletin 593.***



Kawneer Company, St. Charles, Illinois, has installed a second pair of Hevi-Duty reverberatory furnaces for breakdown and holding in direct-chill ingot casting of four different alloys. Furnaces provide ± 10° F. control, pour at 1320° F., operate 24 hours a day. Capacity is 100,000 lb a day. Note in the foreground two of the 6,300-lb aluminum ingots produced. ***Please write for Bulletin 591.***

Circle 592 on Page 53

Better castings start here...



...modern production facilities to supply the nation's steel and foundry industries with large (and small) tonnages of purest quartzite.

IDEAL FOR CORES AND MOLDS—excellent flowability . . . highly permeable . . . low oil and bond requirements . . . can be re-used more times than ordinary foundry sands (Ottawa's hard, round-grain silica holds up better under all types of reclamation systems. Smooth surfaces clean easily—no crevasses or cleavage planes. Fewer original binders to remove).

REDUCE YOUR TOTAL SAND COSTS AND CASTING REJECTS—
SWITCH TO OTTAWA SILICA!

OTTAWA SILICA

HYDRAULIC MINING

DRAIN BINS

SCREENING

QUALITY CONTROL LAB.

MAIL US YOUR TYPE OF METAL AND SIZE OF CASTING SECTION. WE WILL BE HAPPY TO SEND OUR RECOMMENDATION FOR GRAIN SIZE

99.9% PURE SILICA

Serviced by truck, barge and two main trunk railway systems, Ottawa offers fast delivery to all corners of the nation.

OTTAWA SILICA COMPANY

PLANTS LOCATED AT:

OTTAWA, ILLINOIS • ROCKWOOD, MICHIGAN
OCEANSIDE, CALIF. • LANTERN HILL, CONN.

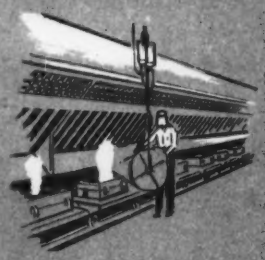
Circle 593 on Page 53

SCHNEIBLE
McDANIEL

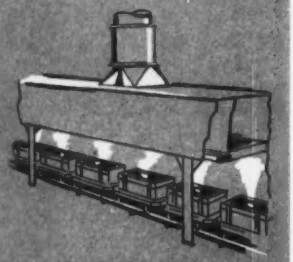
COVERS AIR POLLUTION FROM STATIONS TO STACKS

IMPROVED CONTROL EQUIPMENT FOR FOUNDRIES

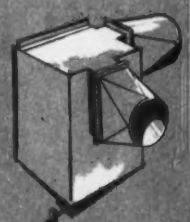
SHAKEOUT HOODS



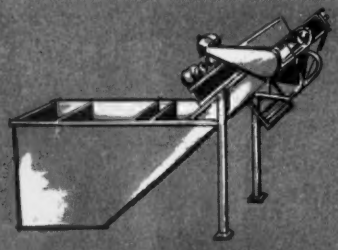
POURING HOODS



CONVEYOR HOODS



VELOCITRAPS



SLUDGE CONVEYOR TANKS

EFFICIENCY THAT MEETS ALL REQUIREMENTS

Schneible offers a full line of air pollution control equipment employing either wet or dry collection units: the Multi-Wash wet collector, long a standard for foundries; and now, the new Multi-Dyne dry collector, a general-purpose unit. Capacities range from 1000 to 50,000 cfm for Multi-Wash, and up to 10,000 cfm for Multi-Dyne.

Many types of hoods are available for all foundry work stations—from the standard Uni-Flo hood to the Uni-Flo fractionating type hood which allows use of smaller dust collectors, and Uni-Flo compensating hood for pouring stations that reduces heat loss in winter and provides efficient year 'round air control.

More Schneible SW cupola collectors are in use today than any other type. For efficiency and trouble-free operation the SW has become a standard with foundries the country over.

A variety of sludge collection tanks are offered —from small dewatering tanks, to large volume concrete settling tanks for multi-unit systems.

For collection of large abrasive particles, Schneible has the Velocitrap which is especially adapted for use in systems used for grinding and chipping operations, to reduce needless duct wear.

Schneible can equip your foundry for the most efficient and economical control of dust, fumes and odors. Write or phone for an engineering consultation on your problem.

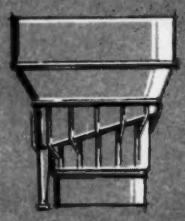
CLAUDE B. SCHNEIBLE CO.

Box 296 Roosevelt Pk. Annex
Detroit 32, Michigan • TAshmoo 5-7772

McDaniel has excellent facilities for making ASME pressure vessels, storage tanks, or custom-built types of plate and sheet steel fabrication. Write or phone for information.

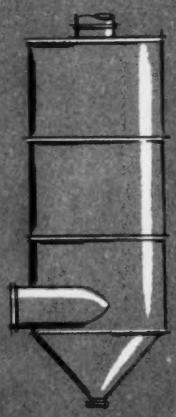
McDANIEL TANK MFG. CO.

Holly, Michigan **WOodward 3-9647**

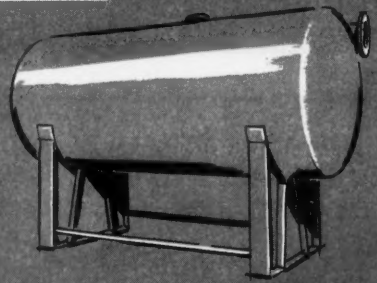


SW CUPOLA COLLECTORS

MULTI-DYNE DRY COLLECTORS



MULTI-WASH WET COLLECTORS



McDANIEL ASME PRESSURE VESSELS-STORAGE TANKS

"Relax with Magcobar at the 64th Casting Congress & Foundry Show, Booth 438."

ONLY MAGCOBAR HAS ALL FOUR

the winning combination in your foundry operations

Magcobar
AGRICULTURAL AND INDUSTRIAL PRODUCTS

- ♥ YELLOWSTONE, Western Bentonite
- ♣ AUTO BOND, Bentonite for Gray Iron
- ♦ SOUTHERN STAR, Southern Bentonite
- ♠ and, MAGCOBAR SERVICE.

MAGNET COVE BARIUM CORP.

HOUSTON, TEXAS
P. O. Box 6504

ROLLING MEADOWS, ILL.
3950 Industrial Ave.

Circle 595 on Page 53

YOU'LL DO A BETTER JOB

with H. V. ADAMS DESIGNED

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.

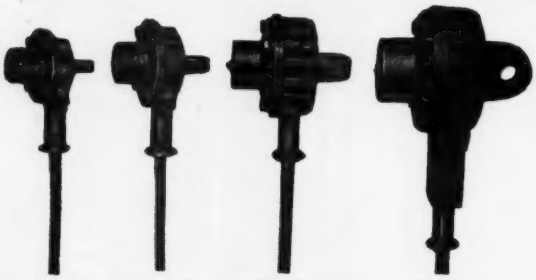
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- SPEED
- ECONOMY
- SAFETY
- LONGER LIFE
- GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

RESTORE COSTLY COPPER COMPONENTS TO FULL EFFICIENCY at a fraction of replacement cost

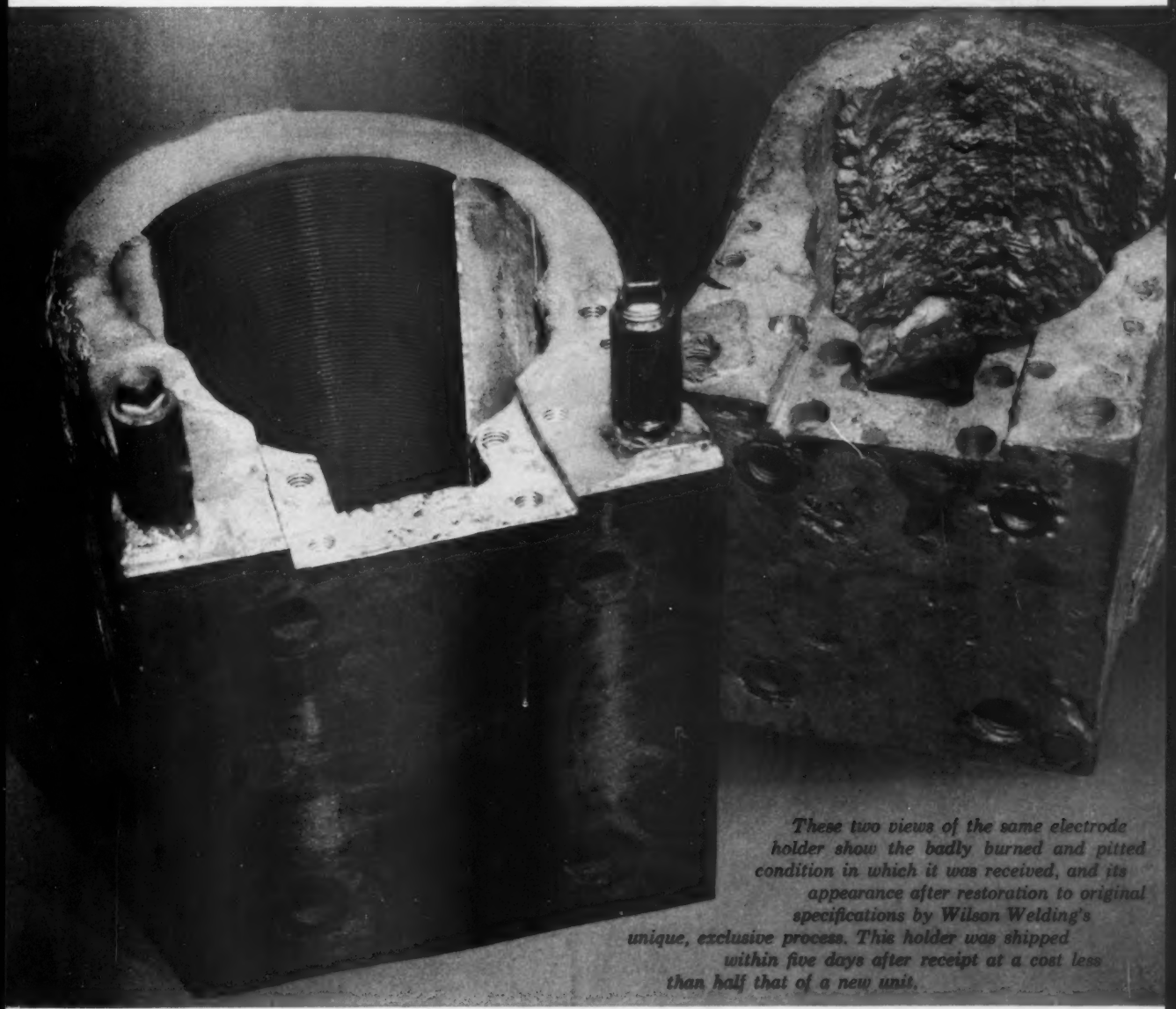
ELECTRODE HOLDERS, BUS TUBES, CABLE CLAMPS, TUYERES

Foundry operators throughout the industry are saving literally thousands of dollars by taking advantage of Wilson Welding Company's patented process for rebuilding costly copper electrode holders, bus tubes, cable clamps and tuyeres.

After being restored to original specifications, or modified to meet your requirements, such items are guaranteed to perform and give life expectancy equal to that of new units and at substantial savings. Repair prices are based upon the amount of labor and material cost involved and rarely equal 50 per cent of replacement cost.

Prompt service reduces costly down time. Ordinarily jobs are completed and shipped within five days after receipt. In emergencies this service can be accelerated to meet your requirements.

Don't discard or scrap badly burned, pitted or scarred units. They are costly and can be salvaged. Write or call Wilson Welding Company, Inc. for cost estimate or additional information without obligation.



These two views of the same electrode holder show the badly burned and pitted condition in which it was received, and its appearance after restoration to original specifications by Wilson Welding's unique, exclusive process. This holder was shipped within five days after receipt at a cost less than half that of a new unit.

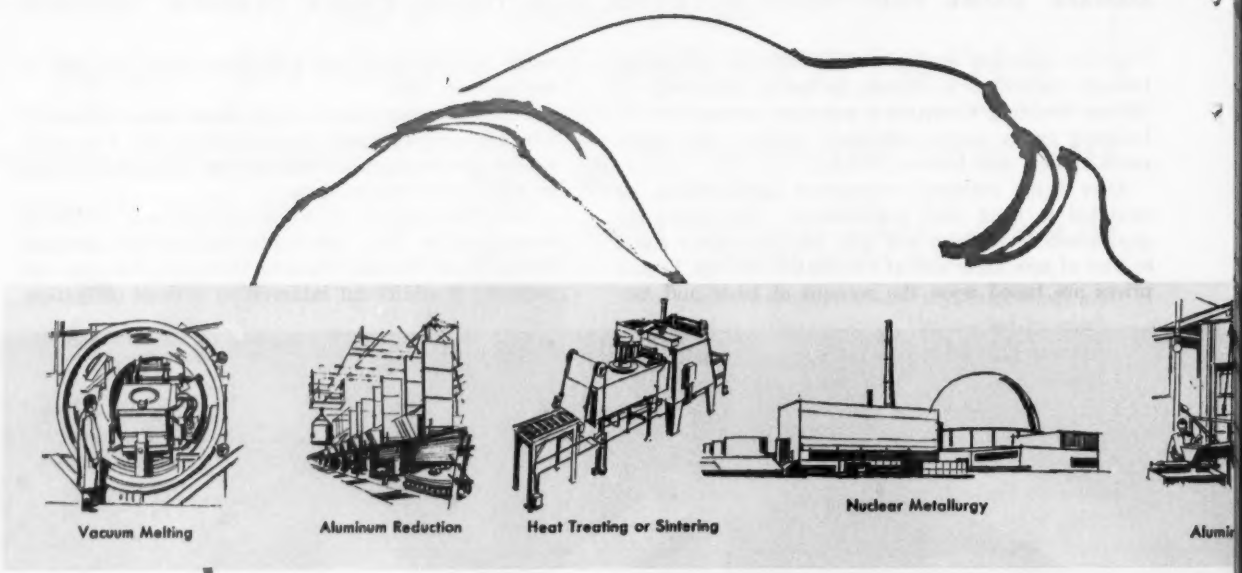
WILSON WELDING COMPANY, INC.

COPPER AND COPPER ALLOY WELDING

Now serving 200 steel mills and foundries throughout the United States and Canada

P. O. BOX 1634
221 HIGH STREET
ALTIZER ADDITION
HUNTINGTON, W. VA.
JACKSON 3-6281

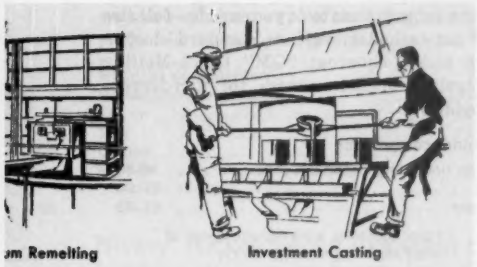
Circle 597 on Page 53



Dynamically combined to

Modern metallurgists work closely with Norton Company's "Men with the Facts" in creating better refining, alloying and processing methods. Drawing on the broad, varied range of Norton Refractories, they solve problems ranging from metal transfer for aluminum remelt to critical vacuum-melting techniques.

The advanced development of Norton Refractories and their availability in commercial quantities permit improvement of metals and metal processing throughout industry. All of the following refractories play vital roles. ALUNDUM* fused aluminum oxide for . . . melting ferrous and non-ferrous alloys . . . high temperature processing furnaces . . . investment casting. MAGNORITE* fused magnesium oxide refractory cement or shapes for melting steel and processing nuclear metals. Fused zirconium oxide for handling "special" metals and alloys at even higher temperatures. CRYSTOLON* silicon carbide for aluminum reduction cells, aluminum remelt furnaces, transfer systems and many other applications. And Norton "Men with the Facts" are constantly exploring *potential* applications for newer Norton materials — other oxides, borides and carbides of the refractory metals.



...m Remelting

Investment Casting

solve your metallurgical problems...

NORTON Refractories and the NORTON Man

ROBERT W. LOVE played a key role in the development of refractories for high temperature melting of high purity alloys. A typical Norton "Man with the Facts," he has also pioneered in vacuum melting, aluminum reduction and remelt, investment casting and nuclear metallurgy. Always on the alert for new and challenging problems, Bob and other Norton "Men with the Facts" are ready to help *you* in the proper application of Norton Refractory Materials.

Find out how Norton Materials and Capabilities can contribute to the development of new processes or improve your present product or process. Write today for the informative new presentation on Norton Refractory Materials and Capabilities — NORTON COMPANY, Refractories Division, 304 New Bond Street, Worcester 6, Mass.

*Trade-Marks Reg. U. S. Pat. Off. and foreign countries

NORTON

REFRACTORIES

Engineered... Rx ...Prescribed

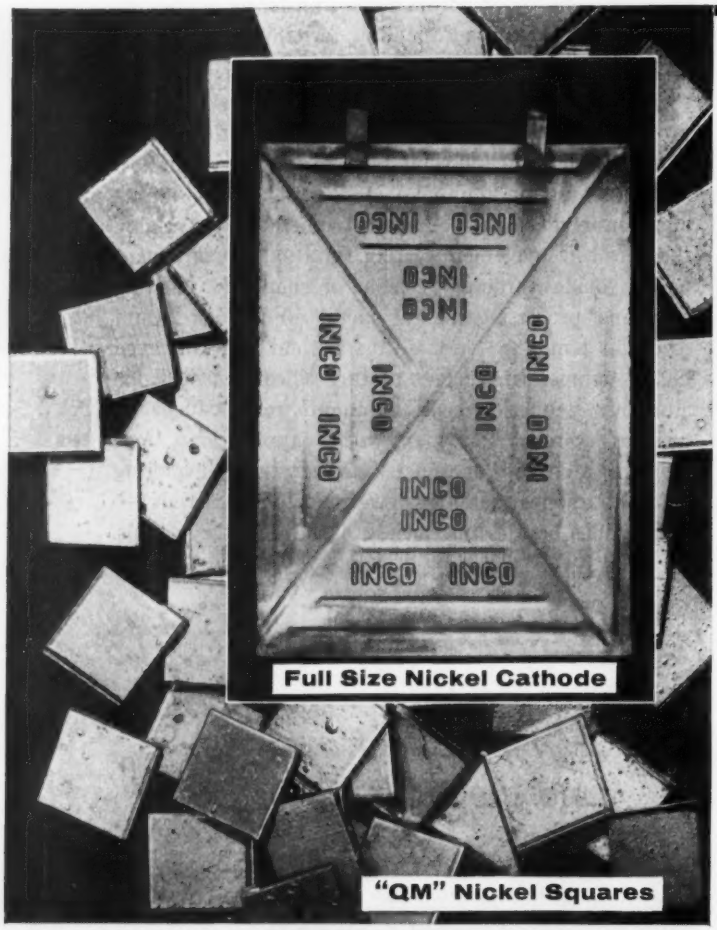
75 years of . . . Making better products . . .

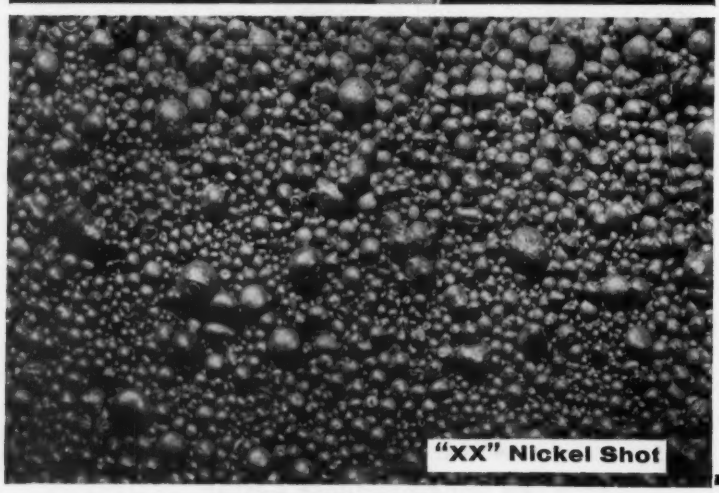
to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 598 on Page 53

Make sure of your melts with





Nickel for general alloying

High-purity Electrolytic Nickel for ferrous and non-ferrous alloying. Inco Nickel cathodes are one of the purest commercial forms of Nickel . . . economical, too. For charging into most common furnaces such as electric, cupola, open hearth.

Available in sizes to fit your needs—full size and cut cathodes; various standard electrolytic nickel squares; "QM" Quick-Melting electrolytic nickel squares for non-ferrous alloying.

Nominal composition

Nickel (including cobalt)	99.95%
Iron	.01-.04
Copper	.01-.03

Fully complies with requirements of A.S.T.M. Designation B 39-22.

Sizes available	Approx. size, in.	Packaging	Approx. wt., lbs.
Full size cathode	(38x28½x⅜)	Skid pallets or loose.	145
Cut cathode sizes	(12x28½x⅜)	2000-4000 lb. skid pallets and skid boxes; also loose in carloads or truckloads.	45
	(9x28½x⅜)		36
	(4½x28½x⅜)		18
Standard nickel squares	(9x9x⅜)	In steel drums 500-725 lb.; also in 3000-4000 lb. skid boxes.	12
	(4x4x⅜)		2½
	(2x2x⅜)		–
	(1x1x⅜)		–
"QM" Quick Melting nickel squares	(1x1x⅛)	In steel drums 425 lb.	–

High-purity "XX"* Nickel Shot for alloying with iron and steel at spout or ladle. It is produced by pouring molten electrolytic nickel into a water bath. Standard sizing is obtained by screening through a one-inch opening and remaining on an .053-inch opening. Packed in 475 lb. drums.

Nominal composition

Nickel (including cobalt)	99.60%
Iron	.15
Silicon	.10
Carbon	.10

YOU ARE INVITED . . . so be sure you visit Inco's exhibit at the 64th AFS Castings Congress and Exposition, May 9-15 in Philadelphia. Ask our representatives at Booth 1303, 1404 for available technical information on Nickel products and how they improve the properties of iron, steel and non-ferrous castings.

*Trademark of International Nickel Company, Inc. • **The INTERNATIONAL NICKEL COMPANY, Inc.** • 67 Wall Street, New York 5, N. Y. INCO

high-purity Inco Nickel products

Nickel alloys for iron melts

High-purity "F"* Nickel Shot and Ingots for addition to gray irons. Shot melts at 2300° F for quick solution in molten iron. Sized between .25" and .0193" for easy addition at ladle or spout. Packed in 500 lb. drums. Ingots, about 5 lb. each for convenience in direct cupola charging, are also packed in approximately 500 lb. drums.

Nominal composition

Nickel (including cobalt)	92.00%
Silicon	5.50
Iron	1.65
Carbon	.55
Copper	.20

Nisiloy* Nickel-Silicon Inoculant for improving machinability in gray irons. The only inoculant improving *both* machinability and tensile strength. "Nisiloy" inoculant also improves uniformity and fineness of graphite distribution, wear resistance and toughness, while reducing chill and casting defects. Melts at 1800° F, diffuses rapidly. Supplied in granules sized ¾" to 20 mesh. Packed in 500 lb. drums.

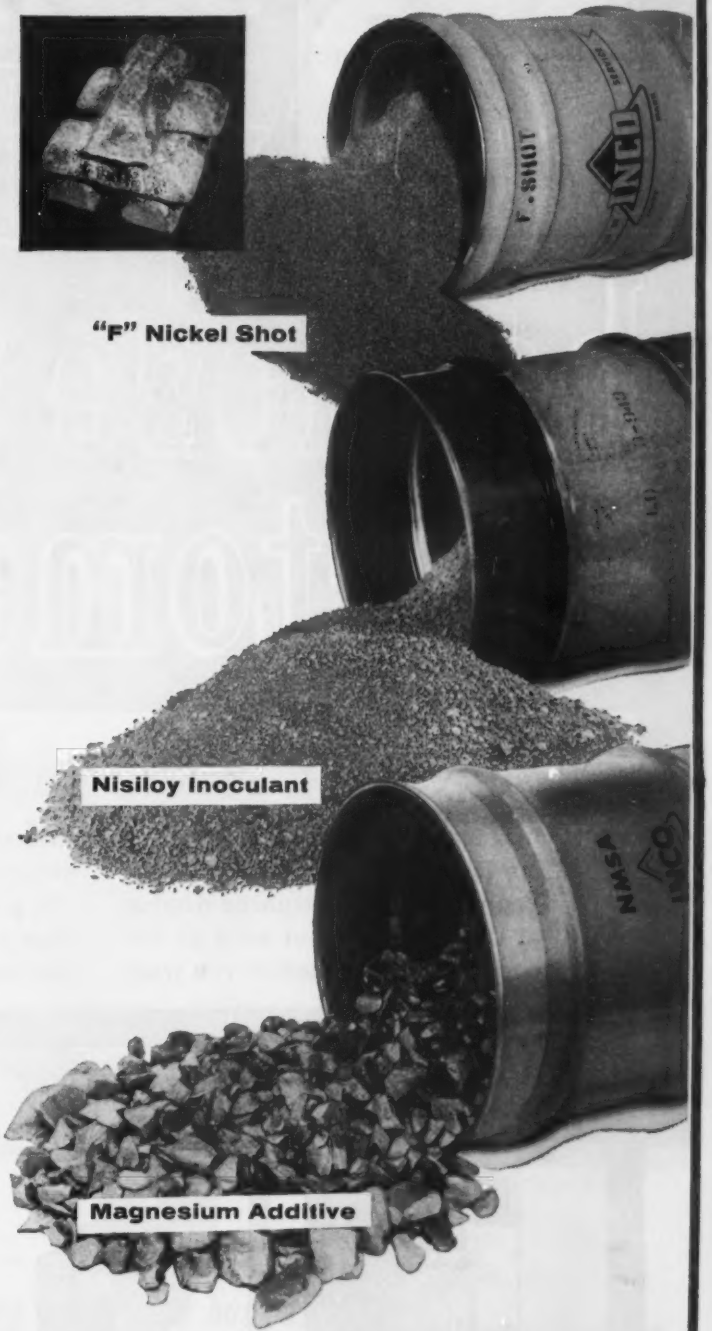
Nominal composition

Nickel	59.00%
Silicon	29.00
Iron	balance

Magnesium Additives – NMA #1* and NMSA #2* for obtaining desired properties in both regular and austenitic ductile irons. Useable with all types of melting units, with all methods of ductile iron production. Supplied in 2 sizes –2¼" x ¾" and 1" x 8" mesh.

NMA #1 Additive for high strength ductile iron. Provides most efficient magnesium recovery. Compared to other commercial additives, it has good response to heat treatment. Packed in 500 lb. drums. **Nominal composition:** 15% magnesium, balance Nickel.

NMSA #2 Additive for toughness, ductility. Efficient in magnesium recovery. Has fair response to heat treatment. Packed in 400 lb. drums. **Nominal composition:** 15% magnesium, 30% silicon, balance Nickel.



INCO NICKEL

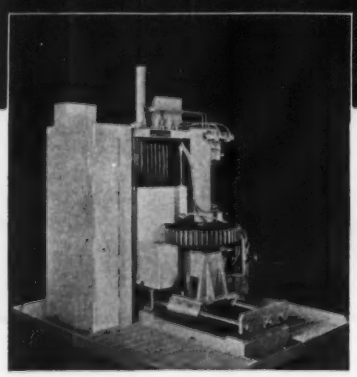
NICKEL MAKES CASTINGS PERFORM BETTER LONGER

Circle 599 on Page 53

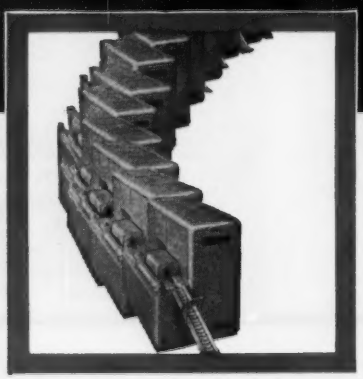
we like to be close to our customers...

and future customers!

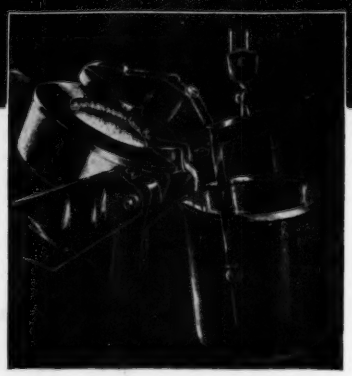
Ajax Magnethermic Representatives are located in major market areas. You will find the telephone number of the office in your area on the opposite page. Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.



HEAT TREATING... AM makes Induction heat treating equipment for either high production or job shop operation. Shown above—the versatile gear hardener... heat treats 6" to 60" diameter gears.



BILLET HEATING... Press the button, that's all! The AM Billet Heater delivers a billet at exact temperature to the extrusion or forging press.



MELTING... AM supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring, vacuum and degassing.

AJAX Magnethermic CORPORATION

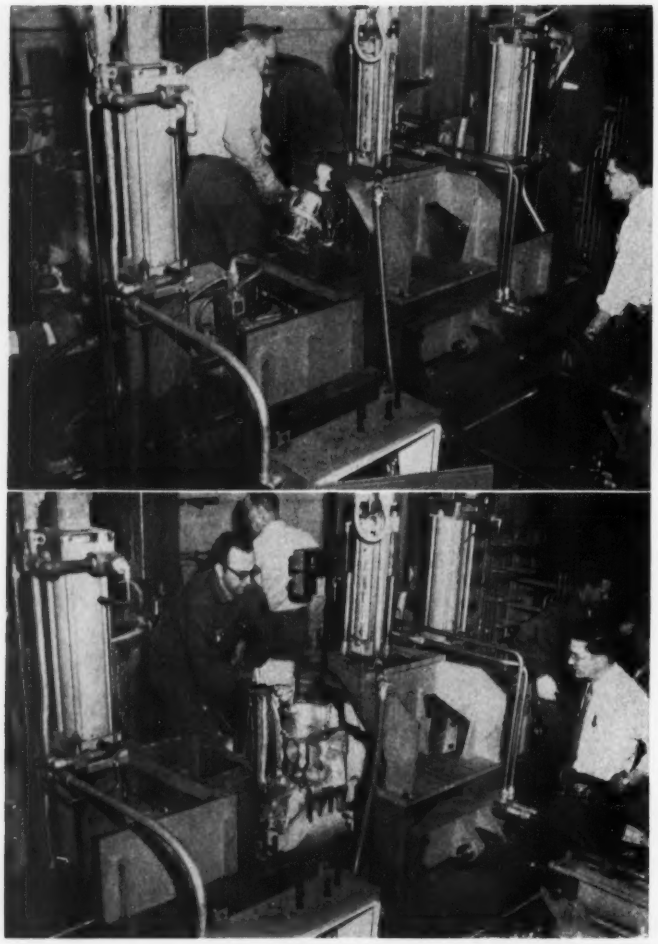
induction heating is our only business!

GENERAL OFFICES
P. O. BOX 839
Youngstown 1, Ohio

TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

Circle 600 on Page 53



Top illustration shows two men pouring aluminum into a permanent mold of a transmission case. Bottom picture shows the finished casting being ejected after the molds have opened

SELF CONTAINED AUTOMATICALLY CYCLED PERMANENT MOLD MACHINE PRODUCES 23 LB ALUMINUM CASTINGS

Because of the ever increasing size of aluminum castings used in the automotive industry, the PERMANENT MOLD DIE CO. devoted a lot of time and effort toward the development of automatically cycled permanent mold machines for the production of large automotive aluminum castings. The one pictured here is of minimum weight. Machine can accommodate larger castings. This automatically cycled machine is the perfect answer to all those questions. Check these points:—Fully automatically cycled and self lubricated—Variable timing—Nonflammable hydraulic system, water cooled—Automatic casting ejection. These machines have been developed and proved only recently, but the profits they have made for users are already in the records. If you are interested in the economical production of large aluminum castings on a given number per day basis, you might want to ask us about our machines.

The Permanent Mold Die Company has long earned the respect and confidence of automotive manufacturers. For years they have specialized in the production of permanent molds and cores, and die cast dies. Qualified engineering and foundry personnel can tackle and solve any permanent mold problem you care to throw at them. Best of all, company prices are well within reason. Delivery, of course, is always on time.

PERMANENT MOLD DIE COMPANY, INC.

2275 NINE MILE RD., HAZEL PARK, MICHIGAN

Circle 601 on Page 53

the force of FOUNDRY

. . . *force* (fōrs), n. active power, energy, power to persuade or convince.

. . . *FOUNDRY* (FOUN'DRĬ), n. business magazine of the metal casting industries; where 80,000 foundrymen look for information and ideas.

How will the force of FOUNDRY's June issue affect you?

If you're a reader, it is the one source you can look to for a complete news and picture story on the 64th Castings Congress and Foundry Exposition of the AFS. It offers a detailed report on technical sessions and convention activities . . . plus all the usual editorial departments.

If you're an advertiser, it is an opportunity to reach the year's largest audience of metal casting management, engineering and production men. Foundrymen the world over will read and refer to this important issue.

Your advertisement in FOUNDRY's

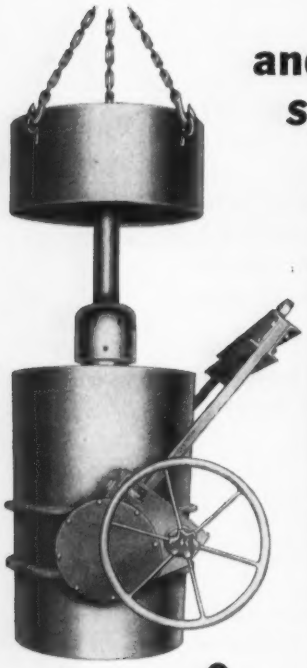
JUNE
POST-CONVENTION ISSUE

will create greater impact with the force of FOUNDRY. Because readers tell us they use both the editorial and advertising pages for help in planning and developing foundry operations, *and* for selection of new methods, new materials, and new machinery. Let the force of FOUNDRY help make your advertising dollars worth more in 1960.

FOUNDRY Penton Building, Cleveland 13, Ohio

Plunging

the most economical way to add magnesium alloys for ductile iron



and the most efficient foundries *Specify* Industrial PLUNGING LADLES

MAXIMUM RATE OF MAGNESIUM RECOVERY

With Industrial's design, the plunger holds the alloy well below the metal's surface to permit complete vaporization of the magnesium. No overtreatment required to assure adequate additions.

MINIMUM SLAG FORMATION

Plunging Ladles by Industrial keep the slag formation factor at an economical low. The ladle is designed to shield the reaction during treatment—minimizing oxidation and assuring cleaner iron.

LESS SMOKE...LESS FLAME

Industrial's Plunging Ladles are of particular interest to foundries located in areas having rigid smoke regulations. The shield which covers the ladle during treatment eliminates virtually all smoke and flame.

CAPACITIES TO FIT YOUR NEEDS

Plunging Ladles by Industrial are available in all the standard working capacities of 1000 lbs. and up.

CONSTRUCTION

These Plunging Ladles are built of the same heavy duty components as Industrial's regular lines of top quality ladles.

Industrial
EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

***For full* Specifications**
write for data sheets 52759

Circle 602 on Page 53

Circle 603 on Page 53→

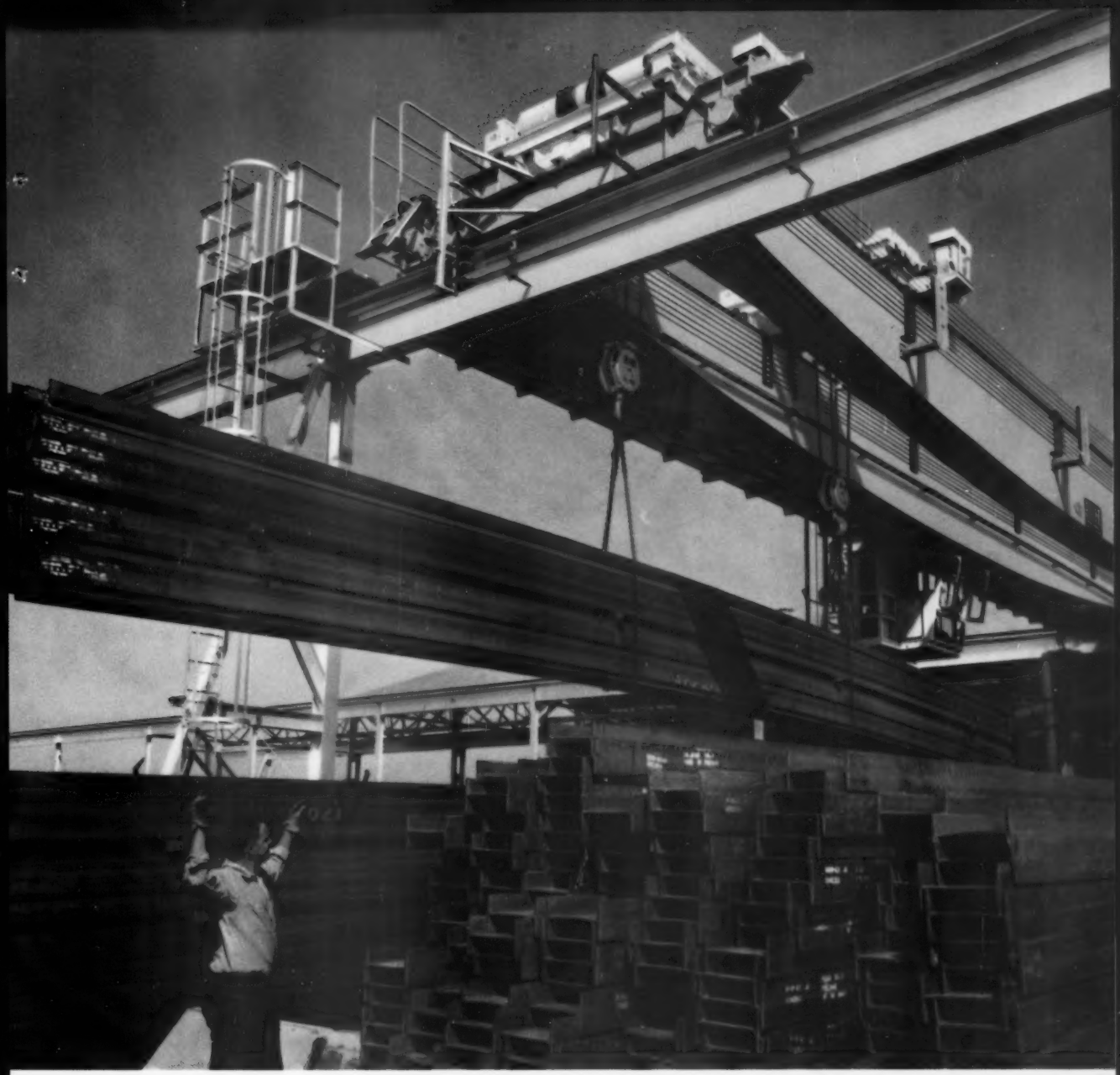


Photo courtesy Pittsburgh-Des Moines Steel Co., Fresno, Calif.

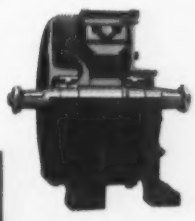
FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN STEEL FABRICATING: This double-trolley crane installation is a good example of the way Harnischfeger engineers design a P&H crane for each particular job. With this arrangement, long, awkward beams can be handled quickly, safely . . . without swinging . . . and with accurate control. In addition, the use of two lighter trolleys permits higher travel speeds, thus combining load stability with fast load handling.

Regardless of the material handling problems your plant may have, chances are P&H engineers have successfully solved similar problems. Reason? No other manufacturer has installed as many overhead cranes in as many different applications as Harnischfeger.

If you'd like more information on P&H job-engineered cranes, write for bulletin C-42, Dept. 119, Harnischfeger Corp., Milwaukee 46, Wis.

Cutaway view of P&H electric load brake . . . heart of P&H Magnetorque Control . . . which consists of a simple, indestructible rotor and stationary field through which braking forces are exerted electromagnetically.



P&H
OVERHEAD CRANES

HARNISCHFEGER

Milwaukee 46, Wisconsin

HE'S AN ATLAS WITH HIS RIGHT THUMB!

Every worker is a wonder-man when it comes to lifting, loading, or transporting shapes in this West Coast steel fabricating plant. That's because a P&H Balanced Design Hevi-Lift hoist provides all the muscle . . . and fine control . . . at any time, in any weather.

Balanced Design means matched components of equal high-strength. There are *no* weak parts in this hoist! It's totally enclosed, weatherproof and dustproof for outdoor use . . . never needs greasing . . . never requires brake adjustment . . . won't heat up even under severe duty cycles.

In short, P&H Balanced Design Hevi-Lifts *will stand up longer under heavier duty cycles — with less maintenance — than any other hoist made today!*

Bulletin H55 tells the whole story. Write Dept. 223, Harnischfeger Corp., Milwaukee 46, Wisconsin.

P&H
HEVI-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

Photo courtesy Pittsburgh-Des Moines Steel Co., Fresno, Calif.

Just a little

Vancoram Ferrovanadium does such a big job! Vancoram Ferrovanadium does an outstanding job in a surprisingly economical way! In constructional steels, tool and die steels, deep-drawing steels, cast and forged steels, and in cast irons, no other alloying element is so versatile. It readily forms stable carbides and controls grain growth. In cast irons it is unusually effective in restraining graphitization. Vanadium imparts toughness, durability, strength and resistance to wear. Try it and see!

Call or write your nearest VCA District Office or VCA distributor for the whole story. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

VCA Products are distributed by: Pacific Metals Company, Ltd.; Steel Sales Corporation; J. M. Tull Metal and Supply Company, Inc.; Whitehead Metals, Inc.; Williams and Company, Inc.

Be sure to visit our Booth (No. 1414) at the AFS Castings Congress, Philadelphia, May 9-13.

VANADIUM CORPORATION OF AMERICA

Producers of alloys, metals and chemicals

←Circle 604 on Page 53

Circle 605 on Page 53

HERMAN
Best Known and
Most Progressive Name
in Engineered
Molding Machines

HERMAN PNEUMATIC MACHINE CO.
UNION BANK BUILDING, PITTSBURGH 22, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Circle 606 on Page 53

another

NEW

and important

engineering

feature

has been

added to

HINES flasks

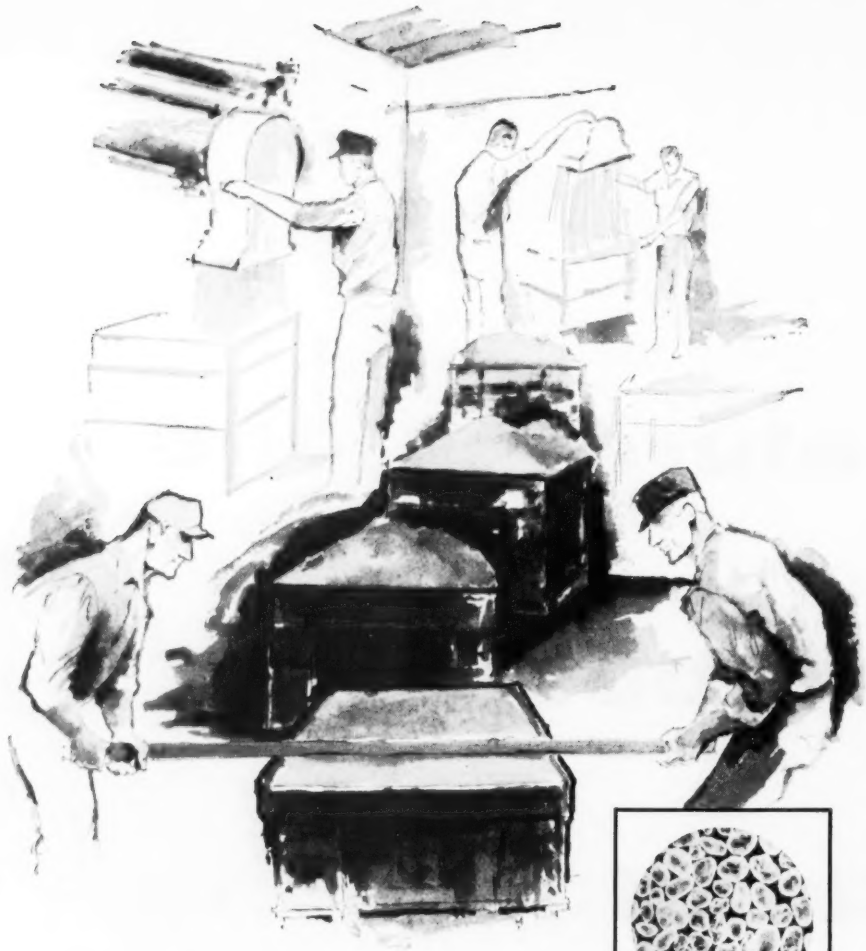
This new HINES operational device may be seen and evaluated at the A.F.S. Foundry Equipment Exhibit.

BOOTH 1407 In the EXHIBITION HALL

THE HINES FLASK CO.

3431 WEST 140th ST. • CLEVELAND 11, OHIO • PHONE: ORCHARD 1-2806

Circle 607 on Page 53



ALL THE MERITS OF ROUNDED-GRAIN QUALITY ARE YOURS WITH WEDRON SILICA...

New casting techniques produce more accurate castings that require less machining. This is the new money-saving dimension in industry that demands finer foundry sands. Wedron's pure rounded-grain is the answer, in case after case where other sands fail. Where accuracy is demanded, Wedron Silica can meet all specifications and give outstanding results. Make your next order pure, uniform rounded-grain sand from Wedron.

WEDRON SILICA COMPANY

135 South LaSalle Street • Chicago 3, Illinois

Send for illustrated brochure on Wedron sands.

MINES AND MILLS IN THE WEDRON-OTTAWA DISTRICT

Circle 608 on Page 53

they turn in top performance to turn out top results

improved grinding action and longer wheel life for faster weld grinding... SIMONDS NEW SERIES 60

DOUBLE XX

Reinforced Resinoid
DEPRESSED CENTER WHEELS

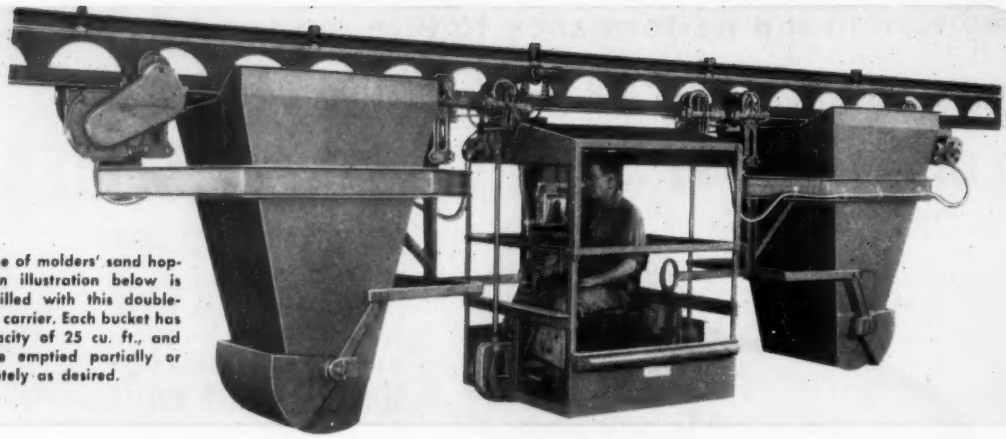
Better than ever for long wheel life . . . faster by far for economical weld grinding. This efficiency is yours with Simonds Series 60 Double XX Wheels. New manufacturing methods give this new series of reinforced resinoid bonded wheels superior grinding action. Each wheel has maximum amount of abrasive grain. Doubly reinforced for extra strength and safety. Lightweight rigid type for general use. Unexcelled for grinding welds. You can also get slightly flexible Fibrex Wheels for lighter jobs and stainless steel. Order from your Simonds distributor.

Send for Bulletin ESA 244

SIMONDS ABRASIVE CO.
Tacony & Fraley Sts.
PHILADELPHIA 37, PENNA.
Division of Simonds Saw and Steel Co.
COUNT ON / YOUR SIMONDS DISTRIBUTOR FAST SERVICE • LOCAL STOCKS

WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO SHREVEPORT — IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

Circle 609 on Page 53



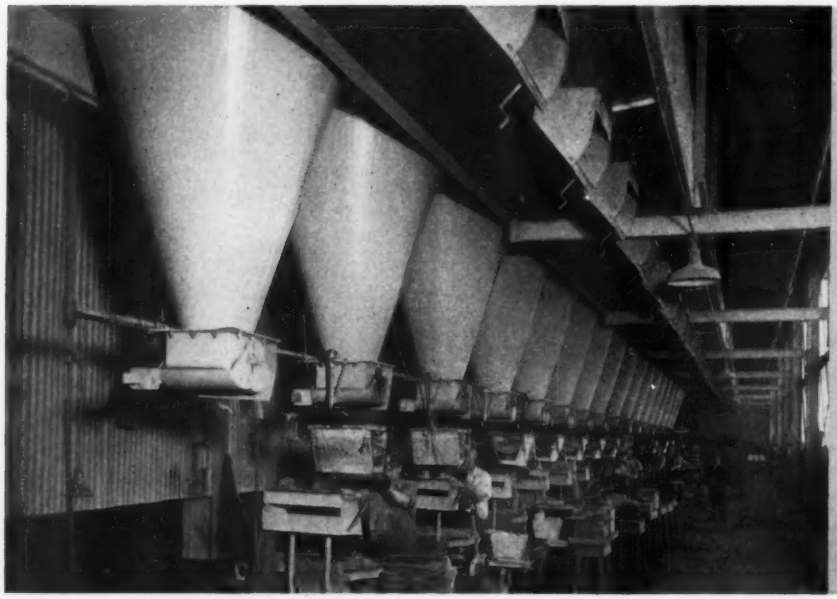
The line of molders' sand hoppers in illustration below is kept filled with this double-bucket carrier. Each bucket has a capacity of 25 cu. ft., and can be emptied partially or completely as desired.

Tramrail Bucket Carrier Speeds Sand to Molders

Do you have 10 or more molders? Do you produce large castings?

Then This Carrier Offers You Important Advantages

If your foundry is of medium or large size, either using a considerable volume of core or molding sand, or requiring sand distribution to a number of points, you should look into the possibilities of a Cleveland Tramrail cab-operated bucket carrier operating on overhead trackage. Consider these advantages:



1. High speed delivery from muller to molders.
2. One Tramrail unit serves many molders.
3. Greatly reduces sand spillage and aids cleanliness.
4. Sand carried in buckets does not lose its moisture content.
5. Easily adapted to foundry layouts of all types. Not confined to straight-line layouts.
6. Long track life is assured because tracks are high carbon with raised wearing treads.
7. Equipment has very few wheels and bearings to require attention.
8. Low overall maintenance.
9. Because of ease of erection or dismantling, Tramrail Systems are easily re-arranged or extended to suit new conditions as they arise.
10. Cost of equipment and operation usually lower than for other mechanized methods.
11. Tried and proven for many years in many foundries.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3834 East 286 Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

90,000 CORES–
ONLY .010" OF WEAR!

Here is a typical example of the excellent wear characteristics of EPOXICAL plastics by U.S.G. Over 90,000 cores were blown in this laminated core box shown here in open view. Inspection by the pattern shop after production run revealed there had been only .010" wear on the lower radius or flange surface which was directly under the blow tubes.

DON'T MISS THIS NEW SOUND-COLOR MOVIE!

"Plastics Tooling and Patternmaking with EPOXICAL Resins" shows how ULTRACAL Gypsum Cement molds are made to produce plastic foundry patterns. See plastic match plates, core boxes, and cope and drag equipment being made—quickly, with improved accuracy, at reduced costs! See how EPOXICAL can help you! For FREE showing—mail coupon!

U.S.G.'s scientifically formulated materials solve foundry production problems

Now, from a single source—United States Gypsum—a *complete line* of gypsum cements and tooling plastics is available for fast, low-cost tooling and pattern production.

Production foundry applications, such as slinger patterns, cope and drag equipment and core boxes have proved the accuracy, strength and durability of these materials. The industry-wide acceptance of EPOXICAL* Tooling Resins is attributed to the uniform quality and ease with which these materials can be applied. They are readily adaptable to both short-run and production requirements, and offer pinpoint accuracy for checking fixtures.

Contact your U.S.G. representative today; he will help you choose—from U.S.G.'s wide product range—the materials best suited for *your* use in pattern or tooling operations. Or for more information about the materials —mail coupon below.

UNITED STATES GYPSUM

Pioneering in Ideas for Industry

*T.M. Reg. U.S. Pat. Off. ULTRACAL and HYDROCAL are trademarks for super-strength gypsum cements manufactured by U. S. Gypsum Co.

Circle 611 on Page 53

United States Gypsum, Dept. F-01, 300 W. Adams St., Chicago 6, Illinois

At no obligation, please provide me with the following:

- ☐ Arrange showing of tooling and patternmaking movie
- ☐ HYDROCAL*—ULTRACAL* Gypsum Cements Bulletin No. 102
- ☐ EPOXICAL Plastic Tooling Resins Bulletin No. 418
- ☐ USG® Metal Casting Plasters Bulletin No. 150

NAME _____ FIRM _____

ADDRESS _____

CITY _____ STATE _____

A REPORT TO FOUNDRIES

FROM TOM BARLOW

NOW IT CAN BE . . .

For some time now, we have had an *inexpensive* remote-control cupola gun ready for the market. This gun can be used either as a two-man machine, or, with an inexpensive "extra," can be completely remote-controlled — a truly "one-man gun." It is ideal for small foundries with less air than needed for the bigger guns like the Cupoliner 1500 or SHM machines. For small operations it can be sold for under $1000 — the only gun in this price class. It also can be purchased in larger versions for the foundry that uses one or more tons of patch material per day. In other words, it broadens the field of foundries that can obtain all the advantages of gun-patching with real money savings. It obsoletes slower and more expensive older-model machines now being used in larger foundries.

If it's so darn good, why have we been holding back?

There is a catch to this gun. That is the reason. But now we can release it because *the problem has been licked.* This gun will do everything a foundryman wants (from a gun) except *handle wet or rebound material. To overcome this, we have a patch material that has no rebound.* Since there is no rebound, we don't have to worry about how to handle it. Simple, isn't it? We're proud of this accomplishment, so please read on and let us boast — it could be worth your time.

The product which makes all this possible is Cupoline 77. (This has nothing to do with Sunset Strip. It means we failed the first 76 times we tried.) This product spent almost two years in the incubator (research laboratory). It was field-tested by a dozen foundries who checked it in daily commercial operations. Incidentally these foundries also checked numbers 73, 74, 75 and 76. These products were close, but 77 was better.

The production facilities were completed last December and production gave us the green light on Jan. 1, 1960. Since then, over 100 foundries have used the product. All but one have reported complete success. (I still haven't figured out what happened to that one.) Many report using only 50% as much material as they did with their previous product. The majority are not that good, but the majority did find a 10 to 25% improvement. *This improvement is in actual life of the patch.* But the reduced burnout is only part of the story. Let's return to why this material permits us to introduce a new, inexpensive patching gun.

When we say that Cupoline 77 has no rebound, we are taking advantage of what some people call "permissible advertising exaggeration." This sounds like "justifiable homicide" but really is not that bad. We mean really that the rebound is so small that it is not worth picking up and reusing. Let's be conservative and say the rebound is less than 5% (actually it's around 2%). With so little rebound, why should the foundryman buy a gun based on its ability to "shoot rebound"? In addition, Cupoline 77 shoots faster and smoother. Maintenance on equipment is reduced to a minimum. All of this simplifies the design of the gun — and reduces the cost of manufacture. Hence we now have a gun to match our new material.

Since the material is called Cupoline 77, the gun will be called the Cupoliner 77. (Our advertising manager is the one who came up with that brilliant thought.) It will be on display in Philadelphia at the show (AFS Convention), so please drop in and see it.

P.S. We are not showing a picture of the machine in this ad because we do want you to have to stop in our booth to see it. (This is known in the advertising world as a "teaser" — again not related to Sunset or any other strip.) If you do miss the show, let us know and we'll be glad to send you more details.

EASTERN CLAY PRODUCTS DEPARTMENT

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

ADMINISTRATIVE CENTER, OLD ORCHARD ROAD, SKOKIE, ILLINOIS, ORCHARD 6-3000

PRODUCTS FOR GROWTH* IMC *TRADEMARK

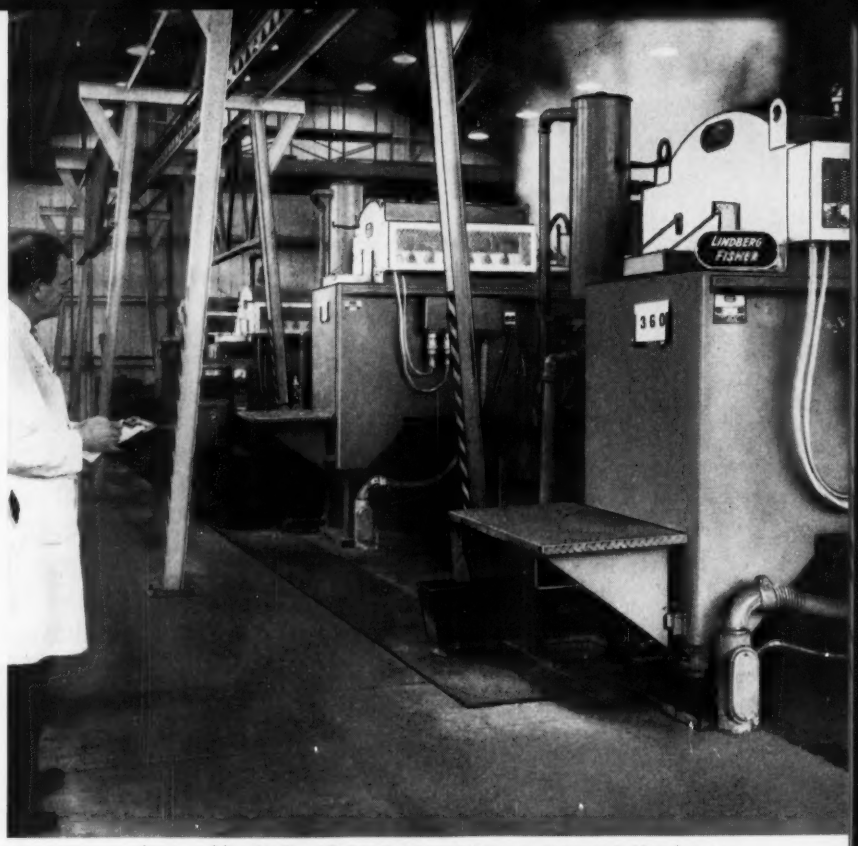
When you apply heat to aluminum Lindberg can give you the right help

If your product requires the application of heat to aluminum, you can safely look to Lindberg for the equipment and methods to do the job best. Anywhere along the line from the ingot to the finished product, Lindberg-Fisher equipment and broad experience can meet every need.

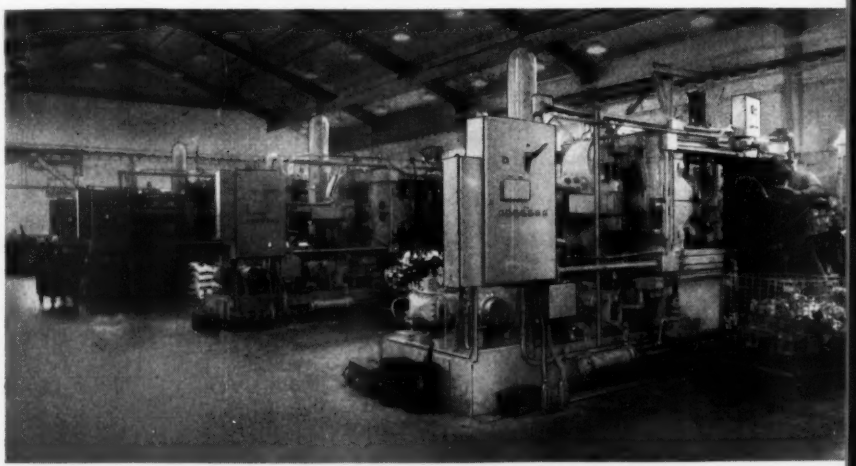
With its long-time background in all phases of heat to industry our engineering staff has standout knowledge of the hows and whys of aluminum melting, casting and treating. Over the years this staff has been responsible for many of the most important developments in the field.

For instance, the technique of putting a cast lining in induction melting furnaces to provide lower initial and maintenance cost . . . the Lindberg Autoladle, the first practical automatic ladling unit . . . the two-chamber induction melting furnace . . . and many other practical innovations. This is why our aluminum processing experts, such as Ray Dunn are frequently consulted in an advisory capacity on aluminum treating problems.

Since we cover all types of equipment for melting, holding or treating aluminum, you can depend upon us to recommend objectively the most suitable procedures and equipment to fit your requirements. Get in touch with your local Lindberg Field Engineer (see your classified phone directory) or write direct to: Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard St., Chicago 12, Ill.



Line-up of four Lindberg-Fisher electric resistance reverberatory holding furnaces at McCulloch Corporation. Die casting machines are just behind each furnace.

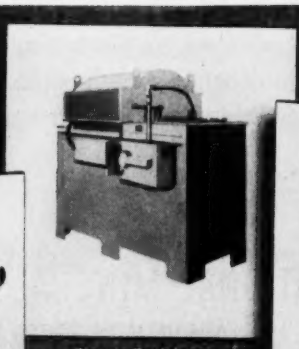


Line-up of four die casting machines at McCulloch Corporation. Lindberg-Fisher Holding Furnaces are just behind each machine.

THERE'S LINDBERG EQUIPMENT FOR EVERY INDUSTRIAL NEED

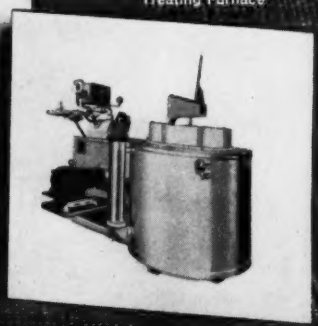
These are representative units from complete Lindberg lines in all types of industrial heating equipment.

The Lindberg Autoladle



Electric Resistance Aluminum Holding Furnace

Cyclone Heat Treating Furnace

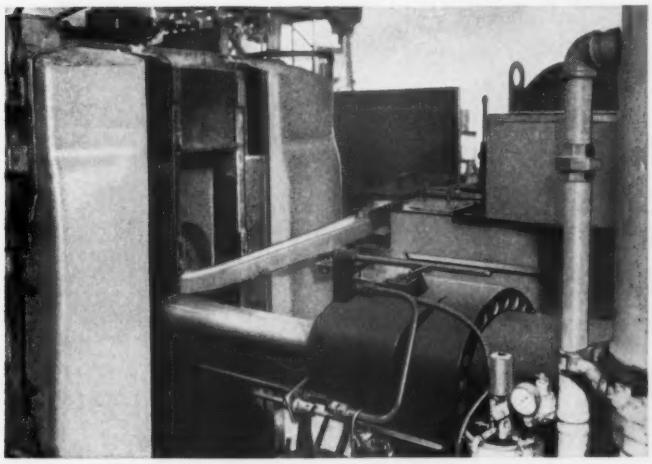


THE RIGHT COMBINATION FOR DIE CASTING EFFICIENCY...LINDBERG FURNACES AND AUTOMATIC LADLING

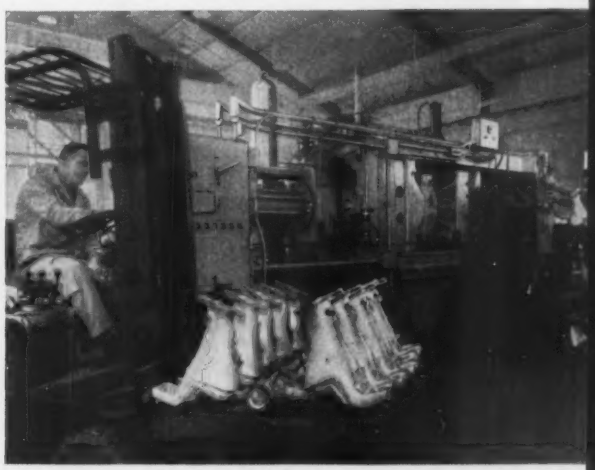
Die casting efficiency at the McCulloch Corporation, Los Angeles, California, has been gratifyingly increased with the new installation of four Lindberg Electric Resistance Reverberatory Holding Furnaces equipped with Lindberg's automatic ladling unit, the Autoladle. These holding furnaces, with 2000 lbs. molten aluminum capacity, are spotted adjacent to four die casting machines. Molten aluminum is delivered to the furnaces by monorail and held at the precise temperature required by the casting station. The precise shot is delivered automatically to the die casting machine by the Lindberg Autoladle. This installation is used primarily for casting parts for McCulloch-Scott outboard motors.

In any production process where aluminum needs heat there is Lindberg equipment to apply it most economically and efficiently, and Lindberg experience to fit this equipment most ideally to your product and production requirements. Furnaces for melting and holding, casting stations, re-melting or heat treating are available in all capacities, electric or fuel fired. Get in touch with your Lindberg Field Engineer (see your classified phone book) or write us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Ave., Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

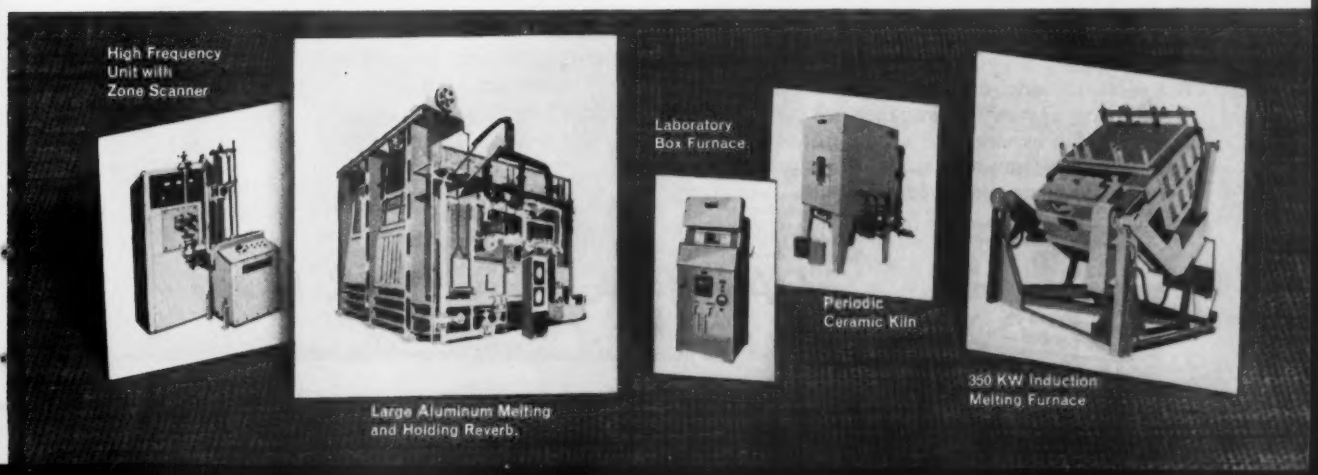
Circle 613 on Page 53



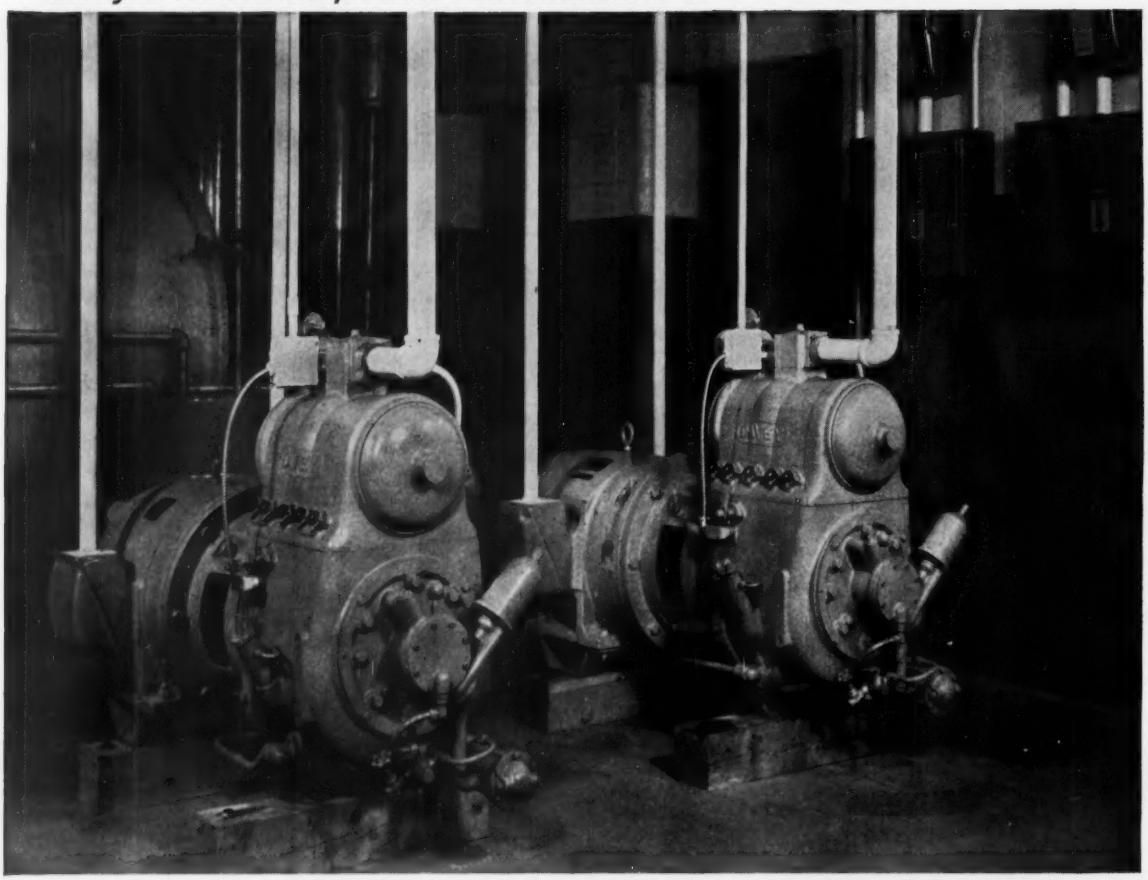
Precise shot of proper temperature aluminum is automatically delivered from conveniently located holding furnace to die casting machine by Lindberg Autoladle.



Housings for McCulloch-Scott outboard motors, shown here, are representative of the type of castings Lindberg equipment helps McCulloch produce.


High Frequency Unit with Zone Scanner
Large Aluminum Melting and Holding Reverb.
Laboratory Box Furnace
Periodic Ceramic Kiln
350 KW Induction Melting Furnace

today's best compressor investment



These 2 Davey 40 h.p. Hydrovanes each deliver 166 c.f.m. of free air for a plastics manufacturer. Unit No. 1, installed in mid-1957, has operated 24 hours a day, 5½ days a week, without shutdown. Machine No. 2 is now in its 6th month of trouble-free service. Note: both compressors are attached to wood blocks, illustrating simplicity of mounting.

DAVEY HYDROVANE ROTARY

Inexpensive to install • Economical to operate
Easy to move • Simple to maintain
**Perma-Vane Blades*

Only one compressor—the Davey Hydrovane Rotary—meets needs of modern production.

Only Davey offers patented, long-life Perma-Vane blades. These eliminate deterioration and breakage—the biggest source of rotary compressor trouble. Davey has 50% fewer working parts than most other units.

Only Davey is quiet, vibrationless, lightweight, compact . . . most inexpensive to install in the least space. Davey Hydrovanes are completely enclosed. No exposed belts or couplings! They can be located anywhere, do not require compressor rooms or special foundations.

Only Davey produces 180° discharge air—lower than reciprocating compressors. Only Davey gives you the option of air-cooled, or water-cooled units.

Only Davey offers a complete line of 2 to 125 h.p. rotary stationary compressors for 100 p.s.i. operation.

For facts about today's *only really modern* compressors, see your local Davey distributor. Or write for Bulletin E. A-1370A

*U.S. Patent No. 2,905,376

Distributors in all principal cities

DAVEY pioneers of "air-cooled air"

Industrial Division

DAVEY COMPRESSOR CO.

Kent, Ohio

See us at Plant Maintenance Show—Booth 117.

MASTER PLAN FOR MODERNIZATION

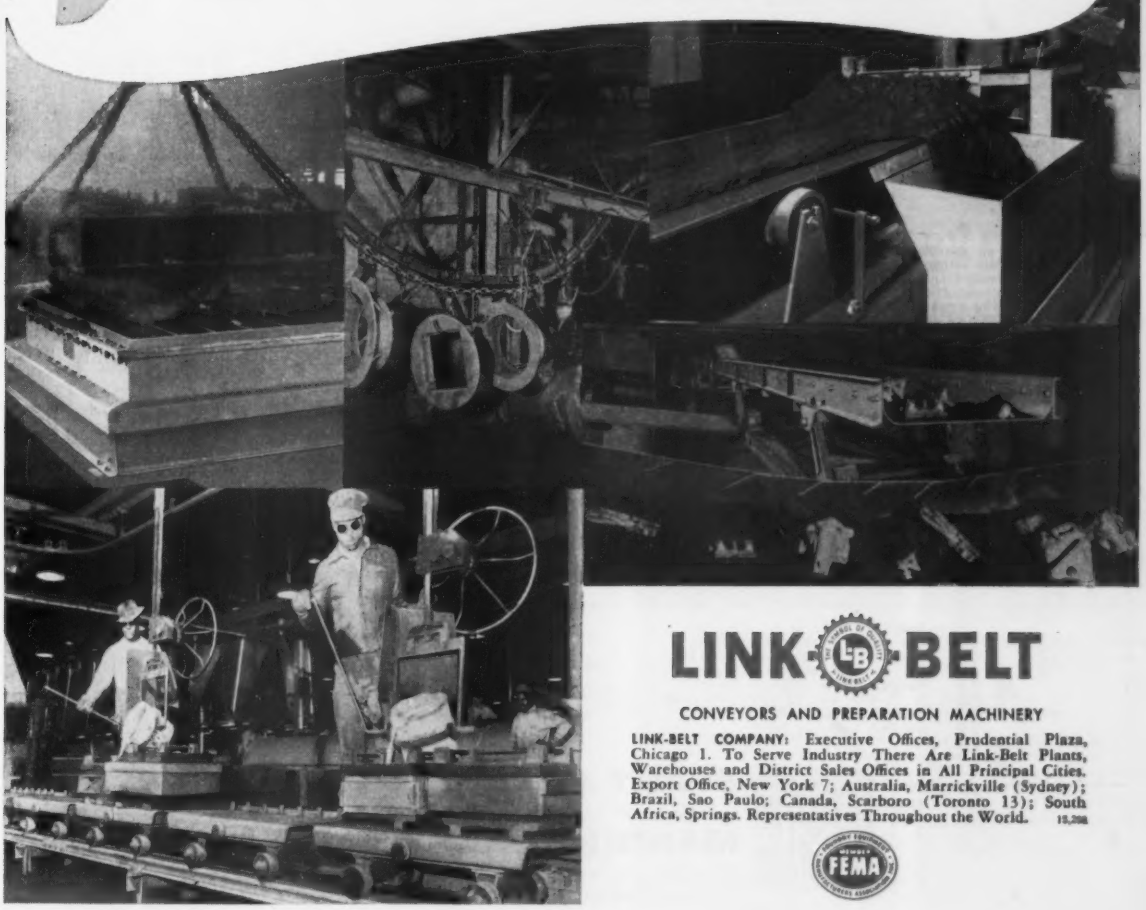
step-by-step mechanization

WITH LINK-BELT EQUIPMENT

MECHANIZATION is the surest way to greater foundry productivity . . . at lower cost. And if budget limitations won't allow a *completely* mechanized system immediately, then a Link-Belt step-by-step program is the answer. Start modernization where you need it most . . . then proceed according to a well-organized plan.

There are two reasons why Link-Belt is *best* qualified to help you plan and carry out a step-by-step improvement program —(1) 50 years' foundry experience. (2) industry's broadest line of conveyors and preparation equipment. Whether it's the handling of sand, cores, molds, castings . . . or a completely integrated system—Link-Belt will provide equipment that results in more efficient operation, lower costs, better working conditions.

Our staff of foundry specialists is available for counsel with you or your consultants. Call your nearest Link-Belt office or write for Book 2423. Ask, too, about our thirty-minute, color-sound film, "Foundry Flexibility." It will be lent on request for viewing by your group.

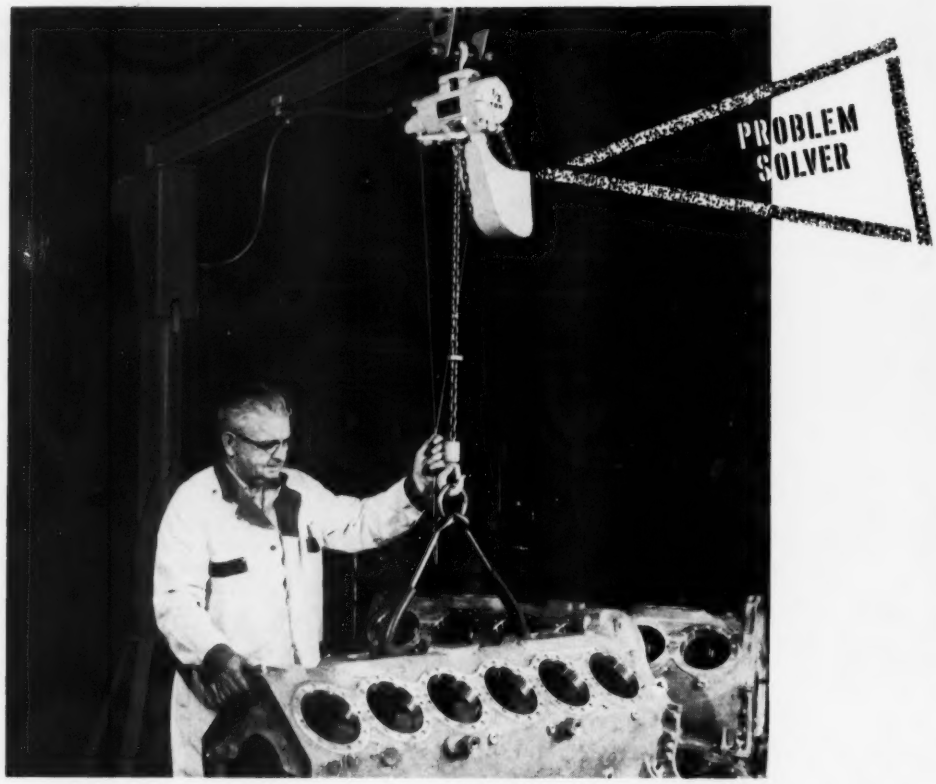


LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

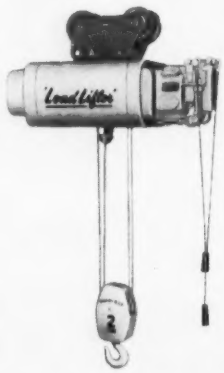
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,208

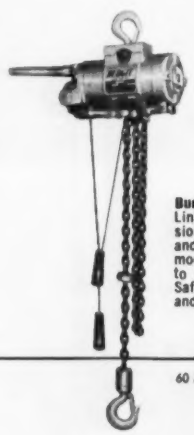
FEMA



Castings handled with care by Budgit® Air Hoist

Load Lifter® Air Hoists. Wire rope type. 1 to 15 tons. High torque 5-cylinder radial motor operates smoothly at all speeds. Speeds infinitely variable to 37 FPM. Pendant cord control. Self-adjusting mechanical load brake. Lug, push trolley and hand-geared trolley suspension.





Budgit Air Hoists. ¼, ½ and 1 ton. Link and roller chain types. Explosion-proof vane type motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pendant cord control. Safety hooks standard. Rigid mount and push trolley available.

Big motor blocks are difficult and expensive to cast and work. Another problem is how to handle them gently (and dependably) from foundry through machining.

One of the nation's largest independent engine manufacturers solved the problem economically with the Budgit Air Hoist. The Budgit provides safe, reliable air lifts where dirty atmospheric and high heat conditions are tough on electric hoists. The air motor can't burn out. Overloads merely stall the motor without harm.

Infinitely variable speed control from c-r-e-e-p to high puts precision accuracy into load spotting. A fast-acting load brake adds to the performance of the Budgit Air Hoist. Setting cores, drawing patterns, closing flasks and many other lifting jobs are done easily and smoothly. Load handling is speeded. There is more time for processing. More units can be turned out and over to assembly per day at lower unit cost.

Phone your Shaw-Box Distributor for complete information about Budgit Air Hoists. If you require lifts to 15 tons ask about heavy-duty Load Lifter Air Hoists. Bulletins available on request. Write for them.

60 A0-2

MANNING MAXWELL & MOORE INC. TRADE MARK

BUDGIT AND LOAD LIFTER AIR HOISTS

A product of

MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Circle 616 on Page 53

Circle 617 on Page 53→

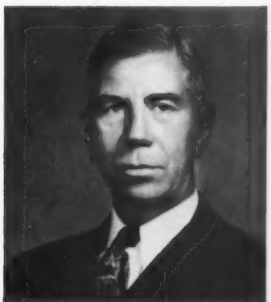
REPUBLIC STEEL IS READY

to help you meet the challenge of the

GOLDEN 60's

with

SERVICE · QUALITY · EFFICIENCY · PRODUCT



"Our recently announced capital improvement program marks our intense emphasis on customer service. In the decade ahead, customers' needs will change even more dramatically than in the past few years. We will anticipate those needs."

Charles M. White,
Chairman

"In this program we will be concentrating on changes, replacements, and additions which will further raise our efficiency. Raise efficiency and you improve product quality. Improve quality and you serve customers better."

Thomas F. Patton,
President

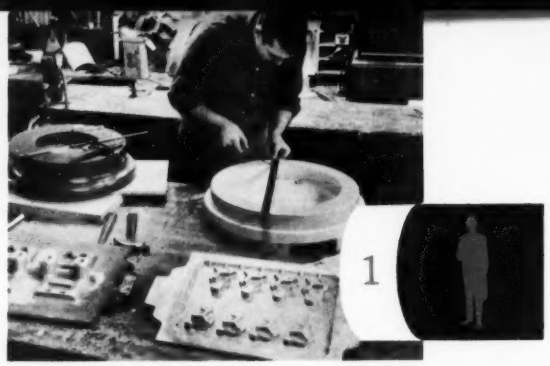
"Customers continue to increase the efficiency of their plants with more modern and costly equipment. Our program will enable us to meet the material requirements and other specifications required by this new equipment."

Norman W. Foy
Vice President in Charge of Sales

"Customers will exercise their right to be more demanding. We are building now to meet specifications which are advanced today but which, we are convinced, will become usual among our customers in 5 or 6 years."

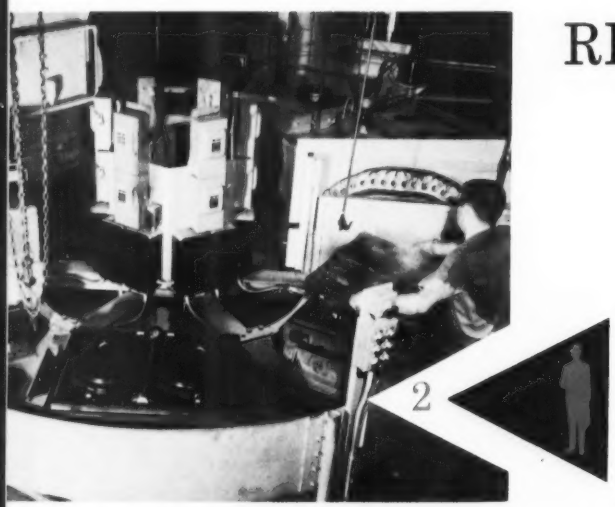
Ernest R. Johnson
Vice President in Charge of Operations

PATTERN MAKING



meeting the challenge

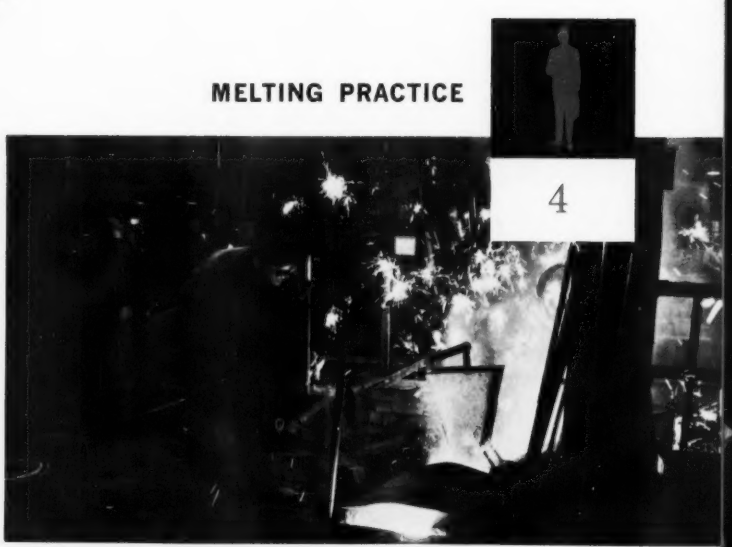
REPUBLIC'S COMPLETE



MOLDING PRACTICE

MATERIAL SELECTION

MELTING PRACTICE



of the **GOLDEN 60's** with...

FOUNDRY ENGINEERING SERVICE

Republic's Complete Foundry Engineering Service goes far beyond supplying industry's most complete line of merchant pig iron. This is *service in depth*. Service designed to help you produce better castings more efficiently, economically, and profitably.

Forming the basis of this program are Republic's Foundry Service Engineers. These men offer more than metallurgical assistance. Their knowledge of pig iron behavior plus their practical foundry experience qualifies them to assist you in every department of your foundry operation from layout and rigging to cleaning and heat treating.

Before you start a new job or an old job with new specifications, call in a Republic Foundry Service Engineer. He can save you experimental time and money on the six basic steps in castings production, as illustrated on these pages. He will recommend, without hesitation or prejudice, the most economical grade of pig iron consistent with the casting to be made. Republic produces all grades of Northern and Southern Iron—Chateaugay, Northern Foundry, Malleable, Bessemer, and Basic; Southern Foundry and Basic.

FINISHING

POURING PRACTICE

Republic Foundry Service Engineers are available to all foundries, large and small, without obligation. Write Republic Steel, Dept. FO-9399, 1441 Republic Bldg., Cleveland 1, Ohio.

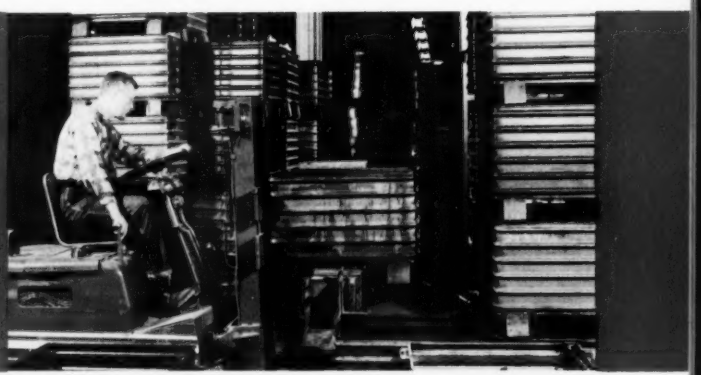
REPUBLIC STEEL LOCKERS give your change, wash, and dress centers a new look. Now available in three bright and cheerful colors. Bonderized feature provides a superior base for the Willow Green, Beige, or Gray enamel finish. Interiors are well designed for convenience and ventilation. Heavy-duty steel construction throughout assures complete protection of personal effects and tools. Complete locker planning and installation service. Send coupon for details.

more Republic products

REPUBLIC WEDGE-LOCK™ STEEL SHELVING is designed to handle the heavyweights—patterns, dies, molds. The heavier the load, the tighter the grip. Wedge-Lock construction includes a post that will not bend, a reinforced shelf that does not sag, and a concealed sway-proof joint. Wedge-Lock assembles quickly and easily. It is completely flexible to meet changing requirements. A Republic Storage Engineering Specialist will help you plan. Mail the coupon.

to meet the challenge of the

REPUBLIC MATERIALS HANDLING EQUIPMENT saves time in stack, store, ship operations, and reduces storage space requirements. Box and skid units feature rugged, corrugated construction to assure long life at low per-year cost. Units can be equipped with stacking brackets, tiering lugs, two and four way channel entries. Our materials handling engineers are always available to assist in design of special units, or to help solve your materials handling problems. Send coupon for literature.



GOLDEN 60's

REPUBLIC STEEL CORPORATION
DEPT. FO-9399
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Storage Engineering Specialist call.
☐ Have a Materials Handling Engineer call.
Send more information on:
☐ Lockers ☐ Wedge-Lock Shelving
☐ Materials Handling Equipment

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

REPUBLIC STEEL

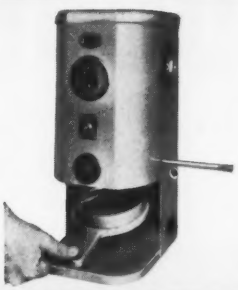
REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

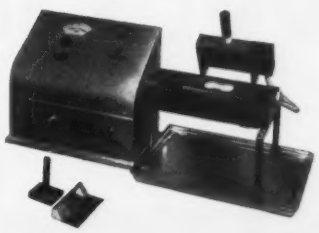
VISIT DIETERT-DETROIT BOOTHS 510-516 IN PHILADELPHIA

SEE

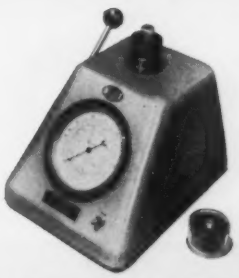
- *A 1911 Brush Auto with Interesting Cast Metal Parts*
- *Dietert-Detroit Time Saving Sand Automation Equipment*
- *New Items Designed to Help Your Foundry Reduce Scrap and Labor Cost—Increase Your Earnings*



Low Cost and Compact Styling are features of the new Dietert Moisture Teller No. 277. Reaches a preset drying temperature FAST.



New No. 365 Hot Shell Tensile Tester for curing and testing shell mixes for tensile strength at curing temperatures.



New No. 338 Electric Permmeter—designed for faster sand permeability tests. No mercury or water is required.

For the Laboratory

Shell Testing Equipment • CO_2 Testing Equipment
High Temperature Testing • Rapid Fineness Test
Green Sand Testing Equipment

For Production Control and Research

For the Sand System

Automatic Bond Addition • Automatic Moisture Addition
Automatic Sand Cooling • Automatic Sand Distribution
Automatic Moisture Recorder

To Reduce Labor Expenses, Minimize Maintenance, Feed Uniform Sand To Your Molders

DIETERT DETROIT

HARRY W. DIETERT CO.

9330 Roselawn

DETROIT 4, MICHIGAN

If you can't attend the 1960 A.F.S. convention, let us mail you details

HARRY W. DIETERT CO.
9330 Roselawn • Detroit 4, Michigan
Mail me details on the following:

- ☐ No. 277 Moisture Teller
- ☐ No. 365 Hot Shell Tensile Tester
- ☐ No. 388 Permmeter

Other:_____

Name_____

Company_____

Address_____

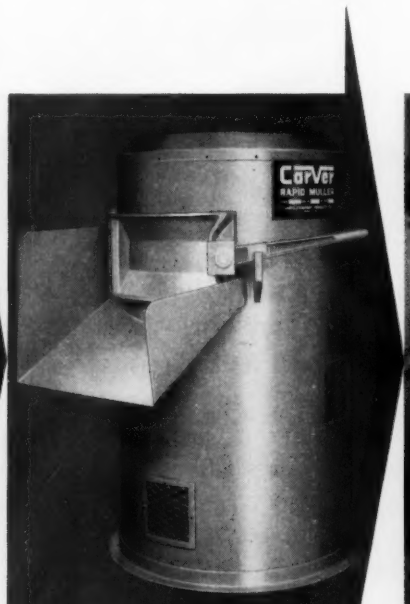
City_____ State_____

Circle 618 on Page 53

Integrate your core and mold operation with

CARVER COMPATIBLE CO_2 PRODUCTS

STEINEX—THE ORIGINAL CO_2 BINDER
(Available only from CARVER).



CARVER RAPID MULLER

KRAUSS Taper-Slot CORE VENTS

CarVer

FOUNDRY PRODUCTS CO.
MUSCATINE, IOWA

ONLY CARVER COMPATIBLE CO_2 EQUIPMENT WORKING TOGETHER CAN ACHIEVE THE MAXIMUM VOLUME and EFFICIENCY NECESSARY TO GREATER FOUNDRY PROFITS!

Match any CARVER muller, shooter or gasser against similar models of other well-known lines and CARVER will out-perform them hands-down!

Match a *complete* CARVER installation against that of any other and *the over-all gain will be even greater.*

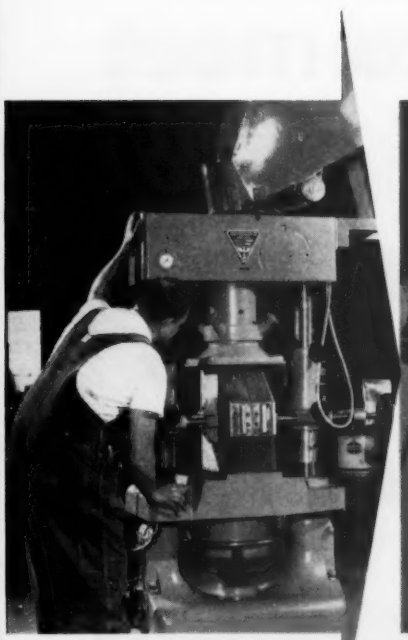
The answer is COMPATIBILITY!

Every CARVER machine was designed to implement the other — in speed — in ease of operation — and in low maintenance requirements.

Working together, they produce more cores and molds at far greater savings in labor, operating, and binder costs.

Cores produced by CARVER COMPATIBLE CO_2 EQUIPMENT are recognized by their faster, more uniform hardening; closer adherence to specifications; and easier shakeout.

Can you settle for anything less?



CARVER V & S CORE SHOOTER

CARVER AUTOMATIC GASSING APPARATUS

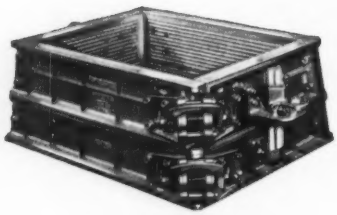
SEE OUR DISPLAY

At the A.F.S. Foundry Show

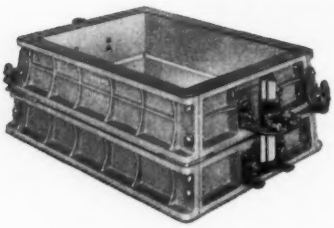
BOOTHS 1536-1538

Circle 619 on Page 53

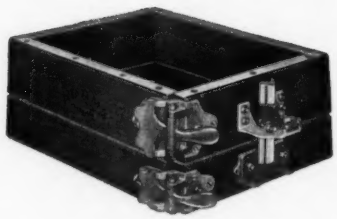
ADAMS . . . . .



Aluminum Easy-Off Flask



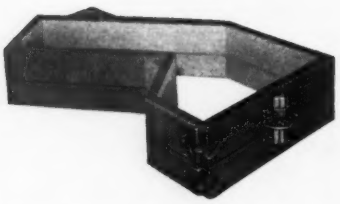
Aluminum Slip Flask



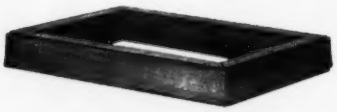
Cherry Snap Flask, tapered

Flask Equipment to meet

Cherry Snap Flask, Round with Cast Iron or Aluminum Jackets



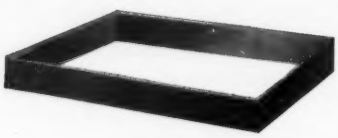
Cherry Snap Flask, Special Shape



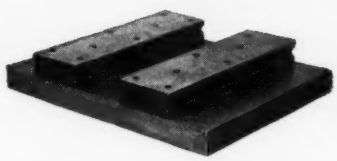
Cherry Upset

in practically all methods

Steel Jacket



Steel Band



Cherry Presser Board

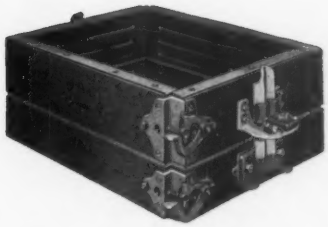
GET THE STORY ON THE MOST COMPLETE LINE OF FLASK EQUIPMENT AT THE 1960 A.F.S. 64TH CASTINGS CONGRESS

Visit our Booth Number 317 at the Philadelphia Convention Hall Auditorium during the show May 9 to 13 at Philadelphia.

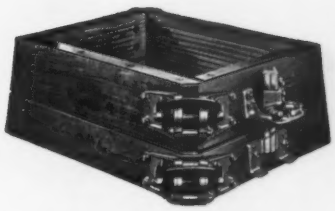
Pin and ear arrangement available to interchange with present Pattern Plate guides.

Handles and trunnions are available where required.

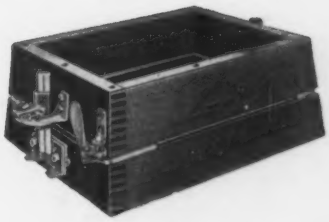
Manufacturers of



Cherry Snap Flask, Straight

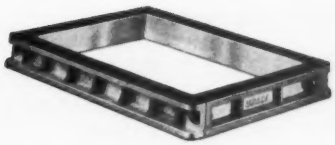


Cherry Easy-Off Flask

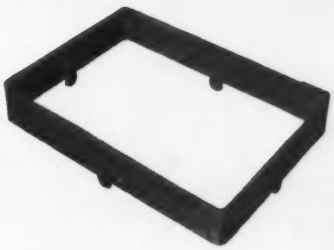


Cherry Slip Flask

your requirements



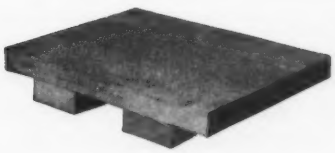
Aluminum Upset



Steel Upset

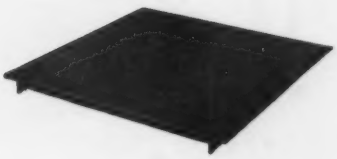
Cast Iron or Aluminum Jacket

# of production.



Wood Bottom Board

No. 1 Steel Bottom Plate



No. 2 Steel Bottom Plate

The ADAMS Company

ESTABLISHED 1883

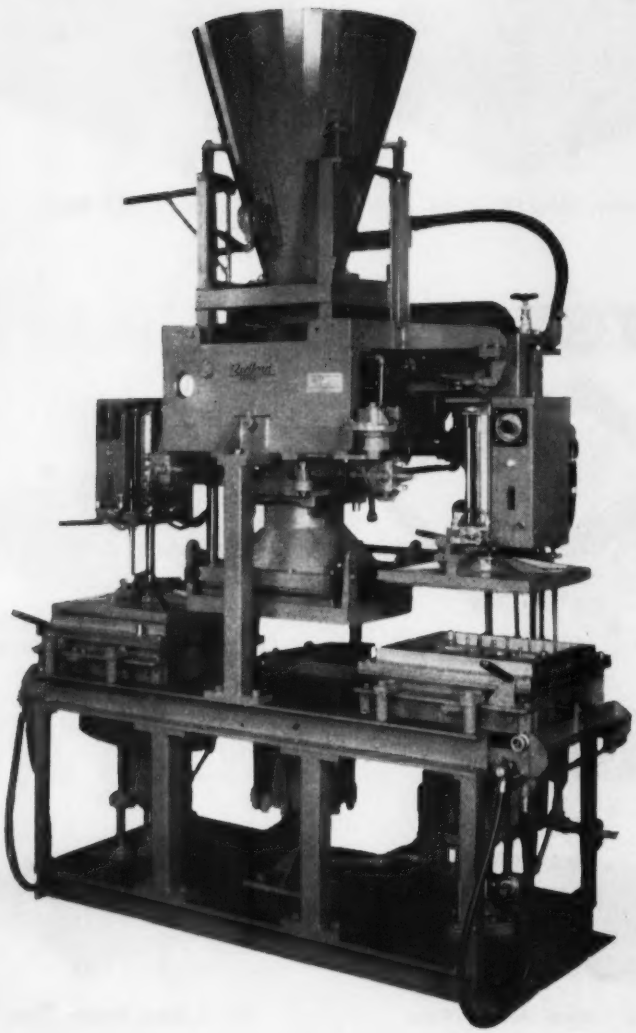
MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 620 on Page 53

Redford

MODEL NO. D-5-H CO_2 MOLD MAKING MACHINE



A proven CO_2 Molding Machine that combines one blow and squeeze and two gassing and stripping stations into one unit for easier handling of mold patterns. Patterns are mounted on carriages which are moved manually from blowing to gassing position. Squeeze plate travel is air operated. The squeeze operation is used to increase mold density and produce perfectly flat molds that can be stacked for pouring.

Electrical reset timers control the automatic gassing and stripping cycle. Maximum standard mold size is 12 x 14 in. and thickness of half molds may vary from ¾ to 2½ in. Up to 90 complete molds-cope and drag-per hour are produced by one operator.

For further information regarding standard Redford CO_2 Mold Making Equipment write for Bulletin 421.

SEE us at Booth #1125 at the A.F.S. Show in Philadelphia

REDFORD

IRON & EQUIPMENT CO.

20733 Glendale - Detroit 23, Mich.

Phone: KEnwood 1-8611

PRINTED IN U. S. A.

Circle 621 on Page 53

Precisely alloyed,
quality controlled, trouble-free:

FEDERATED "ENGINEERED" SILICON, ALUMINUM & MANGANESE BRONZES

For true-acting bronzes, specify Federated Herculoy Silicon Bronzes (excellent fluidity, tensile strengths up to 65,000 psi, yield strengths up to 35,000 psi); Aluminum Bronzes (tensile strength as high as 120,000 psi, after heat treatment); and Manganese Bronzes (as-cast tensile strength, up to 125,000 psi, exceptionally high hardness). Federated "Engineered" Bronzes are the end results of highly perfected production techniques and continuous quality control procedures developed by experienced metallurgists in Asarco's Central Research Laboratories. For complete data on Federated "Engineered" Bronzes, write or call: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N.Y., or your nearby Federated sales office.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

Where to call for information:

ALTON, ILLINOIS
Alton: Howard 5-2511
St. Louis: Jackson 4-4040

BALTIMORE, MARYLAND
Orleans 5-2400

BIRMINGHAM, ALA.
Fairfax 2-1802

BOSTON 16, MASS.
Liberty 2-0797

CHICAGO, ILL. (WHITING)
Chicago: Essex 5-5000
Whiting: Whiting 826

CINCINNATI, OHIO
Cherry 1-1678

CLEVELAND, OHIO
Prospect 1-2175

DALLAS, TEXAS
Adams 5-5034

DETROIT 2, MICHIGAN
Trinity 1-5040

EL PASO, TEXAS
(Asarco Mercantile Co.)
3-1852

HOUSTON 29, TEXAS
Orchard 4-7611

LOS ANGELES 23, CALIF.
Angelus 8-4291

MILWAUKEE 10, WIS.
Hilltop 5-7430

MINNEAPOLIS, MINN.
Tuxedo 1-4109

NEWARK, NEW JERSEY
Newark: Mitchell 3-0500
New York: Digby 4-9460

PHILADELPHIA 3, PENNA.
Locust 7-5129

PITTSBURGH 24, PENNA.
Museum 2-2410

PORTLAND 9, OREGON
Capitol 7-1404

ROCHESTER 4, NEW YORK
Locust 5250

ST. LOUIS, MISSOURI
Jackson 4-4040

SALT LAKE CITY 1, UTAH
Empire 4-3601

SAN FRANCISCO 24, CALIF.
Atwater 2-3340

SEATTLE 4, WASHINGTON
Main 3-7160

WHITING, IND. (CHICAGO)
Whiting: Whiting 826
Chicago: Essex 5-5000

IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

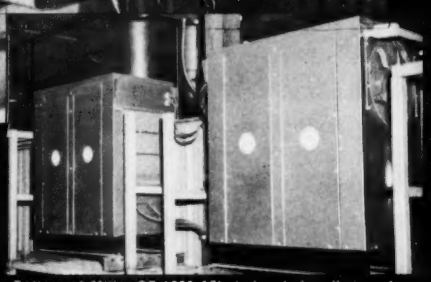
Circle 622 on Page 53

Foundries Find

miller-powered carbon arc cutting

Faster — Cheaper — Better

These photos, taken in well-known foundry, show operator carbon-arc cleaning a casting using an Arcair torch powered by a Miller SR-1000-A7. Note handiness of control console.



Battery of Miller SR-1000-A7's is located well away from cleaning room.

THE MILLER MODEL SR-1000 series, providing 1000 amperes of d-c at 40 arc volts, 100% duty cycle, has proved to be the ideal power source for Arcair and other foundry carbon arc cutting processes. Designed and built around Miller's exclusive semi-metallic, completely sealed Gold Star rectifier, drastic overloads are handled routinely without failure or deterioration. Control console is instantly removable to any reasonable distance. Adjustment of current range from 200 to 1400 amperes is accomplished under load. What's more, the operator can switch in a flash from cleaning and gouging to welding when needed. Operates from three phase power lines.

For applications involving carbon arc cutting, heavy submerged arc welding, plasma jet and electric furnace processes, the Miller SR-1000 series is probably without an equal. May we send you more complete details and specifications?

MODEL SR-1000-A7

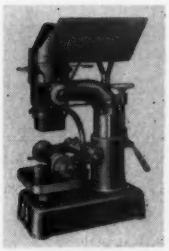
miller ELECTRIC MANUFACTURING COMPANY, INC.

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

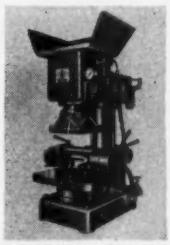
APPLETON, WISCONSIN

HANSBERG *Shooters*

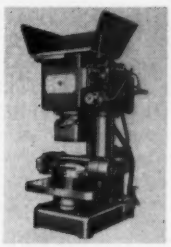
The New Core Shooter Model H-12MO
The Most Successful Core Making Machine of the Last Ten Years. 40 lbs. Capacity



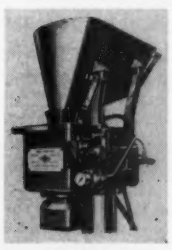
Model H-M
Small Capacity
Bench Model



Model No. H-1M
5 lbs. Capacity
Bench Shooter
with Hydraulic
Core Box Height
Adjustment

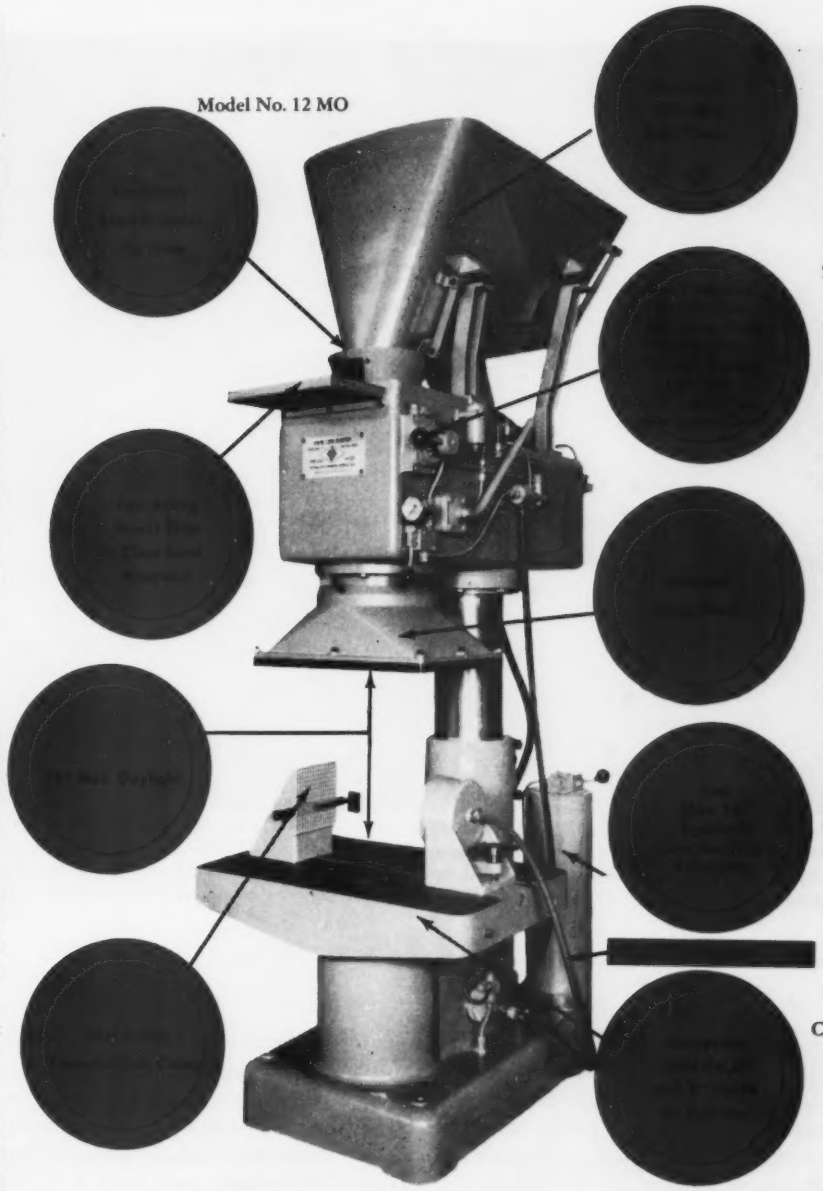


Model No. H-2½M
8½ lbs. Capacity
Bench Shooter with
Hydraulic Core Box
Height Adjustment
with Power
Sand Slide

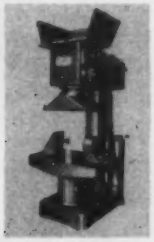


Optional
Automatic
Sand Feeder for
Above Bench
Shooters

Model No. 12 MO



Model No. 12 MO
Down Position



Model H 12 MO
With Standard
Sand Hopper

Model H-12 A
Fully Automatic
Push-Button
Controlled Shooter

Built-in "NORGREN" air lubrication, low air consumption low maintenance, low initial cost, the ideal — CO-2 machine, low set-up time, the best machine for tough sands — increases production — lowers cost. Standard — Special — Universal Shoot Heads. Save money with HANSBERG SHOOTERS.

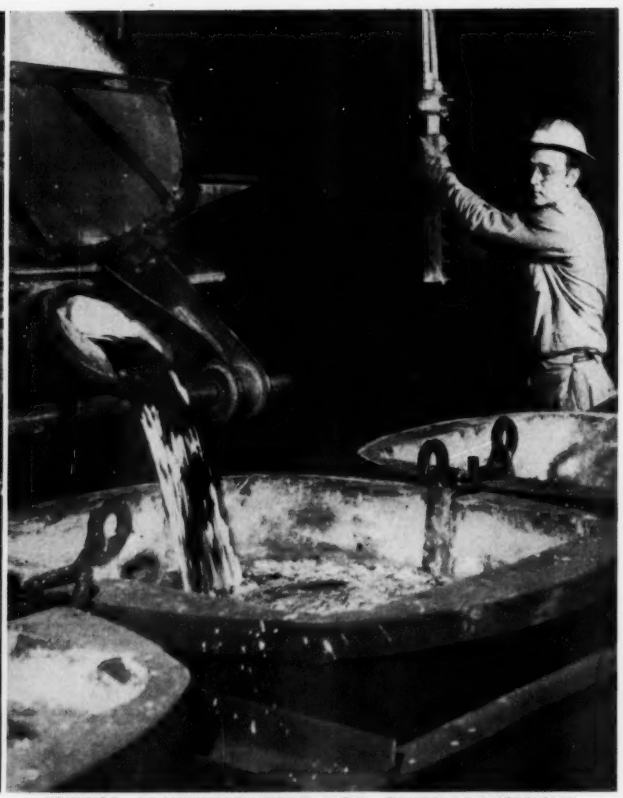
HANSBERG *Shooters* INC.

PHONE UNIVERSITY 4-6565 P.O. BOX 729 EVANSTON, ILL., U.S.A.

Circle 624 on Page 53

YOU, MR. FOUNDRYMAN, A V.I.P. AT

DEPENDABILITY OF SUPPLY. From this huge new plant in Ohio comes a steady supply of primary casting alloys for the foundry industry—sold either directly or through Olin Aluminum Casting Alloy distributors throughout the nation.



METAL ALWAYS FLOWS FOR OLIN ALUMINUM CUSTOMERS. We allot a permanent percentage of this metal to casting alloys—assuring our customers and distributors of continuous performance despite any fluctuations of supply and demand.

The red carpet is always out for foundrymen at Olin Aluminum, as shown by our membership in the American Foundrymen's Society. Our Casting Alloys section is headed up by men with a solid background in the foundry industry. We consider any problem of yours to be a problem of ours.

We know your needs, and we ride herd on every processing step from mine to potline to make sure that each Olin Aluminum ingot is up to the mark on quality, purity and analysis. We maintain—and follow—one of the most detailed Customer Requirement Records in the industry. And we don't sell castings ourselves—

CASTING ALLOY DISTRIBUTORS

ALABAMA
ANNISTON
L. A. Draper Metals, Inc.
ADams 7-3585

CALIFORNIA
LOS ANGELES
McGowan Co., Inc.
ANgeles 3-7575
OAKLAND
Globoloy Metals Inc.
Highgate 4-7249

DELAWARE
WILMINGTON
North American Smelting Co.
OLympia 4-9901

ILLINOIS
CHICAGO HEIGHTS
Benj. Harris & Co.
SKyline 5-0573
INterocean 8-9750

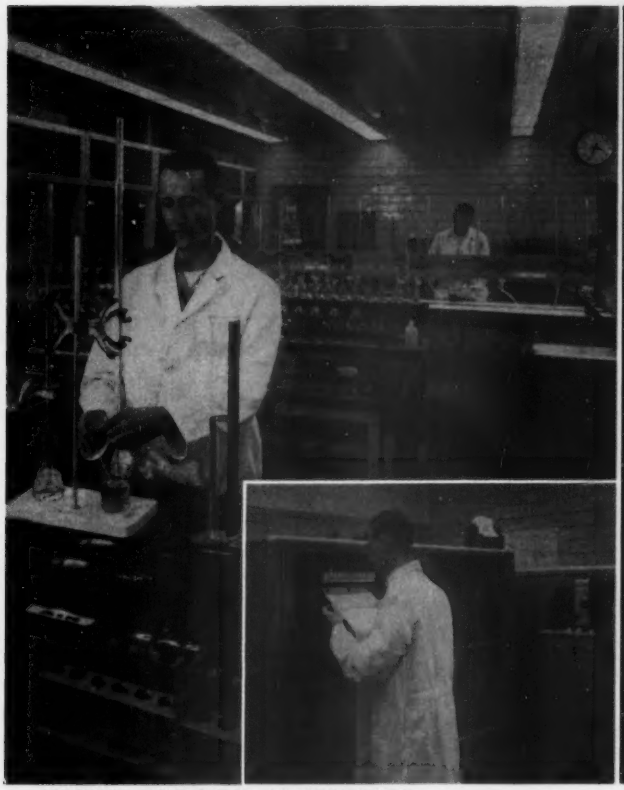
MASSACHUSETTS
MIDDLEBORO
Bay State Aluminum Co., Inc.
Phone: 1251-W

MICHIGAN
DETROIT
Milton A. Meier Co.
TRinity 5-9371

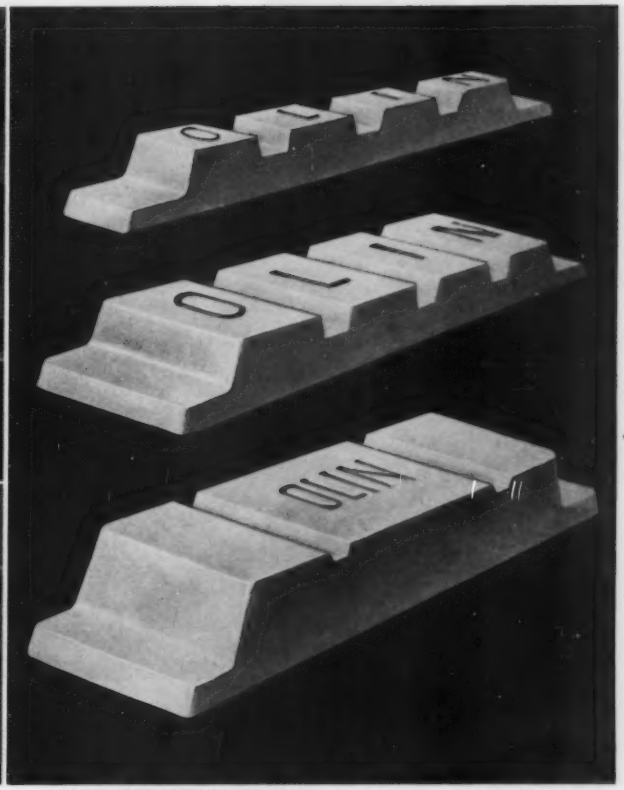
MINNESOTA
MINNEAPOLIS
Harry A. Brown Co., Inc.
PArkway 2-6664

MISSOURI
KANSAS CITY
Altaw Distributing Co.
CHestnut 1-1337
ST. LOUIS
Fischer-Fixman Metal Co., Inc.
JEfferson 5-3481

ARE ALWAYS OLIN ALUMINUM



KNOWN CHEMICAL PROPERTIES. Every melt of Olin Aluminum undergoes exacting metallurgical and production controls. Skilled metallurgists use the latest and most efficient analytical and physical testing equipment.



MORE EFFICIENT FORMS. Olin Aluminum standard casting alloys come in 10, 25 and 50-lb. sizes. The 10 and 25 pounders feature smaller size to facilitate crucible charging, speed handling and melting. Deep notches and 4-section design are for easier breaking.

our policy is to help you to produce good castings. Our Technical Assistance is always available to you. This is only one of the many services we offer. Make Olin Aluminum your source of superior casting alloys — and of metallurgical know-how. Call your local Olin Aluminum office or distributor listed below.

SEE US AT THE PHILADELPHIA CASTINGS CONGRESS BOOTH 1022-24 MAY 9-13

MEMBER OF AMERICAN FOUNDRYMEN'S SOCIETY

NEW YORK
BROOKLYN
Henning Brothers & Smith, Inc.
HYacinth 7-3470-1-2

OHIO
CLEVELAND
Midwest Aluminum Supply Corp.
PRospect 1-8240

CINCINNATI
Cincinnati Steel Products Company
TRinity 1-4444

OKLAHOMA
OKLAHOMA CITY
McCormick Steel Co.
MElrose 4-1492

TEXAS
CORPUS CHRISTI
McCormick Steel Co.
TUlip 4-0305

DALLAS
McCormick Steel Co.
CHapel 7-3104

HOUSTON
McCormick Steel Co.
ORchard 2-6671

LUBBOCK
McCormick Steel Co.
POrter 2-8793

OLIN ALUMINUM®

OLIN MATHIESON • METALS DIVISION
400 PARK AVENUE, NEW YORK 22, N. Y.

Circle 625 on Page 53

Pouring a 2000-lb. casting at ELECTRIC BOAT DIVISION, GENERAL DYNAMICS CORPORATION, Groton, Conn.
The U.S.S. GEORGE WASHINGTON, America's first POLARIS-firing A-sub

RCI Core Binders

Used in precision castings for America's A-Subs

• Precision castings are critical pieces in ELECTRIC BOAT'S gigantic A-sub production puzzle. Every phase of the project is tightly security-sealed. While it is no secret that a variety of A-sub valves, structural boxes, gear cases and other components, are poured — in aluminum-bronze, manganese-bronze, super-nickel and other metals — specifics are unavailable. One thing's for sure: castings must be perfect! And, it is reported that in operations where ELECTRIC BOAT is using RCI Core Binders, they find that excellent results are obtained.

If you have a core binding problem, chances are RCI has already found the answer. Liquid phenolic, liquid amino and liquid oleoresinous core binding resins, liquid sand conditioners, liquid binders (self-curing), and liquid phenolic, powdered phenolic and granulated phenolic resins for shell coremaking and shell molding are all on the list of RCI Foundry Products. Let's talk about Reichhold resins in terms of *your* applications.

FOUNDREZ — *Synthetic Resin Binders*
COROVIT — *Self-Curing Binders*
coRCIment — *Core Oils*
CO-RELEES — *Sand Conditioning Agent*
REICOTE — *Sand Coating Agent*

REICHHOLD
FOUNDRY PRODUCTS

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N. Y.

Creative Chemistry ... Your Partner in Progress

RCI

NEW ANSCO X-RAY SAMPLES tailored to your needs

Free on request

Ansco

Industrial X-ray Materials

Interested in improving your overall radiographic quality? Here's your opportunity! This new Ansco X-ray Sampler will be tailor-made to suit your needs in both film and chemicals. So just fill in and mail the coupon. Soon you'll be testing the best . . . Ansco!

FREE! Illustrated booklet of case histories where radiography and photography have helped increase business efficiency. Wouldn't you like a copy for yourself? See your Ansco representative. Ansco, Binghamton, N. Y., A Division of General Aniline & Film Corporation.

Ansco, Dept. 1
Binghamton, New York

YES! I want to make a critical test of Ansco Industrial X-ray Materials. Please provide additional information on how to obtain a X-ray sample kit.

NAME_____

POSITION_____

COMPANY_____

TELEPHONE NO._____

ADDRESS_____

CITY_____ STATE_____

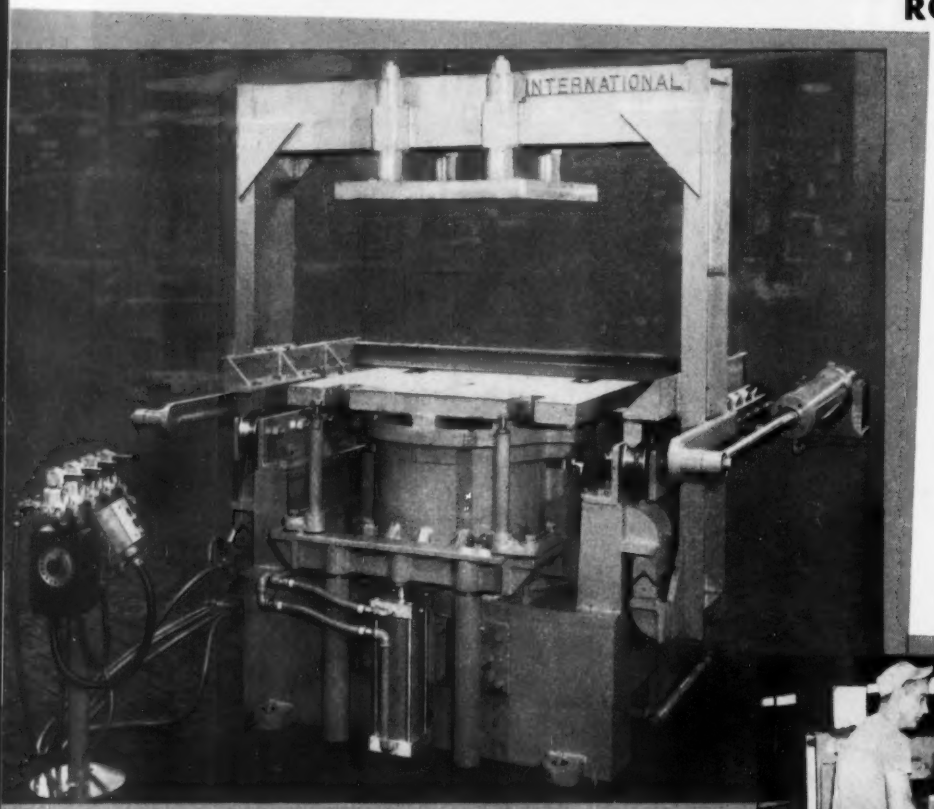
C

Circle 627 on Page 53

Another INTERNATIONAL . .

TYPE SK SERIES

JOLT—SQUEEZE—DROP STRIP OR PIN LIFT DRAW—ROLL ON—ROLL OFF IF DESIRED



International Type SK Series designed for larger requirements incorporating sound engineering features that can be made with—

- any size jolt
- any size squeeze
- any size draw
- for any size job

Type SK Series can also be furnished with partial or completely automatic electric cycle control.

Photo Courtesy of PHILCO CORPORATION—Dexter Foundry Division—Fairfield, Iowa →

Operational Features of the Type SK Series

- Head moves out—away from table of machine for easy loading of flask and sand.
- Positive Jolt Action head moves in—Large V guides insure proper alignment of head over table for uniform squeeze.
- The use of two cushioned draw cylinders, equally balanced, afford a precision draw, resulting in a minimum of maintenance.
- Two large cylinders control the movement of the head with oversize deceleration valves for cushioning.
- Can be loaded from front or side.

See these machines at Booth 1604—Foundry Show, Philadelphia. Write telling us your particular needs. We will forward complete information.

INTERNATIONAL

. FOUNDRY—PROVEN TEAM!

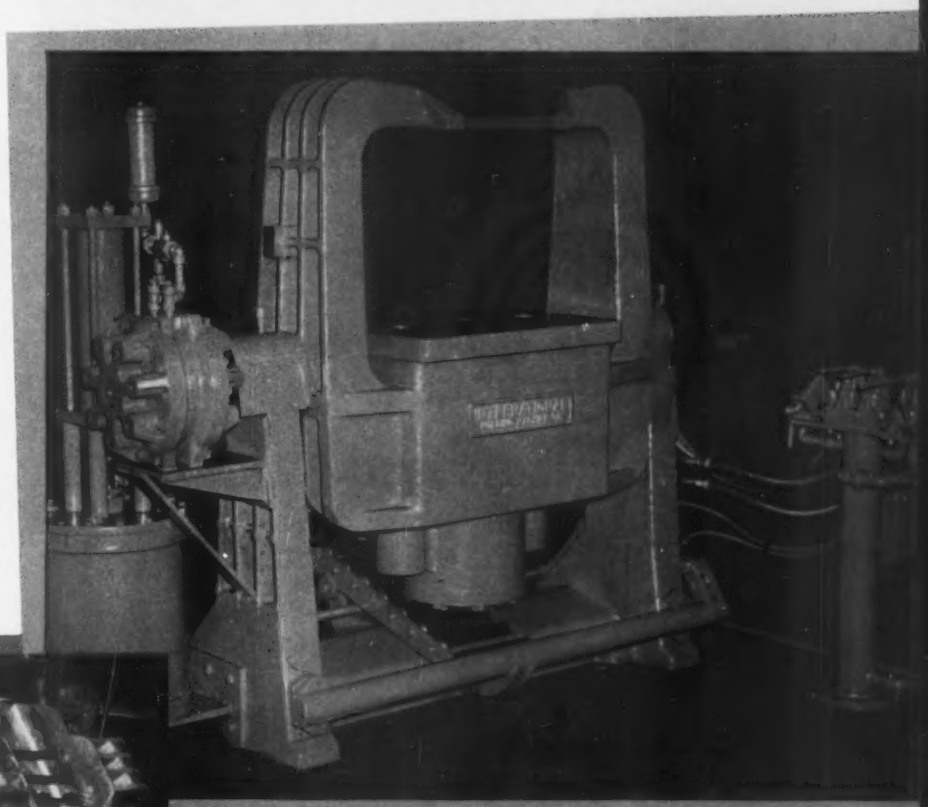
TYPE REJS SERIES

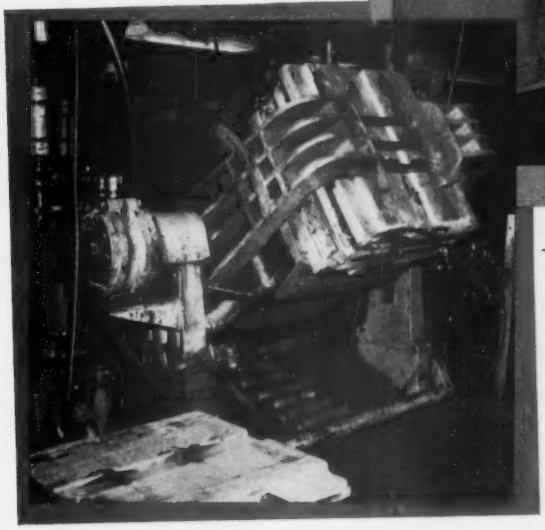
DOUBLE JOLT—SQUEEZE—POWER ROLLOVER—DRAW

The SK and REJS Series provide the ideal Cope and Drag Molding combination. Machine-powered Drag and Cope Molding result in:

- **Ease of Operation**
- **Minimum manpower fatigue**
- **Standardized production**
- **Uniformity of Molds**

Write for complete information on SK Series and REJS Series and see how these machines can benefit your foundry operation.





← Photo Courtesy of MARION MALLEABLE IRON CO., Marion, Indiana

Operational Features of the Type REJS Machine

DOUBLE JOLT—true ram, through two integrated cylinders, jolting in unison, on large anvil striking area

SQUEEZE—heavy duty, mono-cast rollover and squeeze frame insures harder, firmer mold in minimum time

ROLLOVER—positive, air-cushioned, air-hydraulic power roller gives greater speed

DRAW—true internal alignment insures accurate draw

ROLL-OFF—air actuated rollers result in easy discharge of drag flask

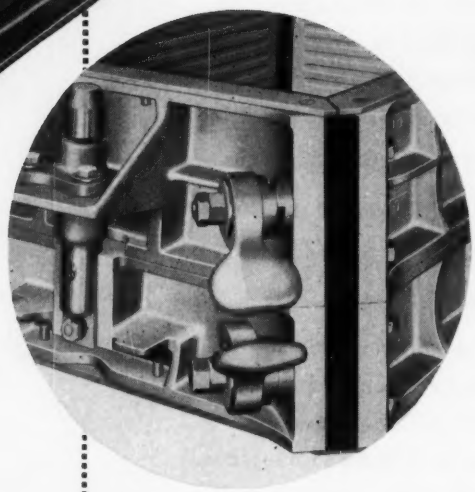
The Type REJS machine can be adapted to your particular needs

The INTERNATIONAL LINE is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

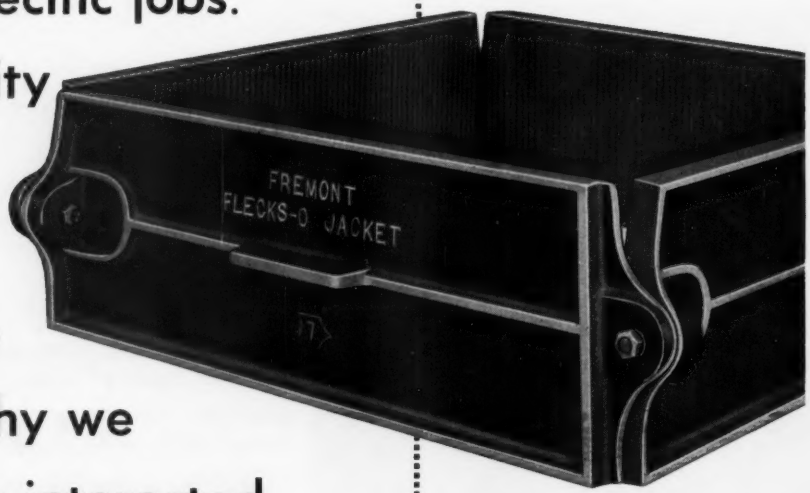
MOLDING MACHINE COMPANY
LA GRANGE PARK, ILLINOIS

50 YEARS of SERVICE to the FOUNDRY

Circle 628 on Page 53



Fremont's Standard Jackets and Flexible Jackets and Spreadlock Flasks are all built to do specific jobs. Their popularity depends on how well they do these jobs. That's why we are extremely interested in their performance at all times.



We'll be looking for you at the Foundry Show in Philadelphia, May 9-13. We'll be set up in the Booth numbered 1338

The Fremont Flask Co., Fremont, O.

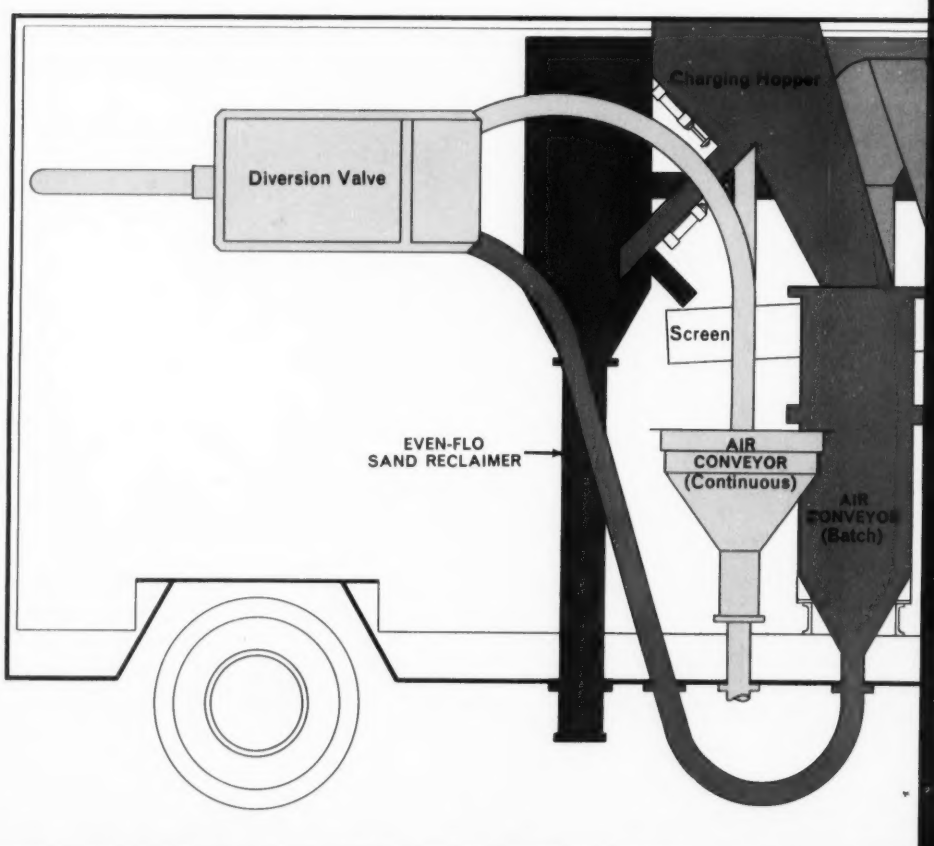
Circle 629 on Page 53

Circle 630 on Page 53→

SIMPSON
FOUNDRY CARAVAN
NATIONAL
ENGINEERING
COMPANY
COMING
YOUR
WAY...
TO DEMONSTRATE
A BETTER WAY...

NATIONAL

- SHELL-MULL
- MULTI-MULL
- COOLEVAYOR
- AIR-CONVEYOR
- EVEN-FLO RECLAIMER

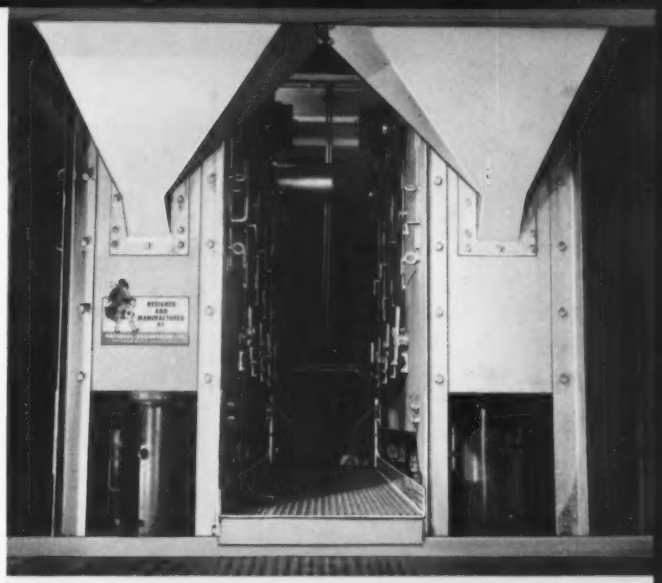


NATIONAL EVEN-FLO SAND RECLAMATION SYSTEM

Pneumatic reclamation within the reach of every foundry.

Typically simple in design and operation, this system has no moving parts . . . only one wear part. Thoroughly proven in over 60 foundry installations where it has reduce new sand costs up to 80%, and:

- *Improves* quality and workability of sand
- Turns in *annual* savings of between $30,000 and $100,000
- Operates continuously without supervision, little maintenance
- Sold under performance guarantee
- Can reduce or eliminate waste sand haulage and disposal
- Handles *any* type of foundry sand



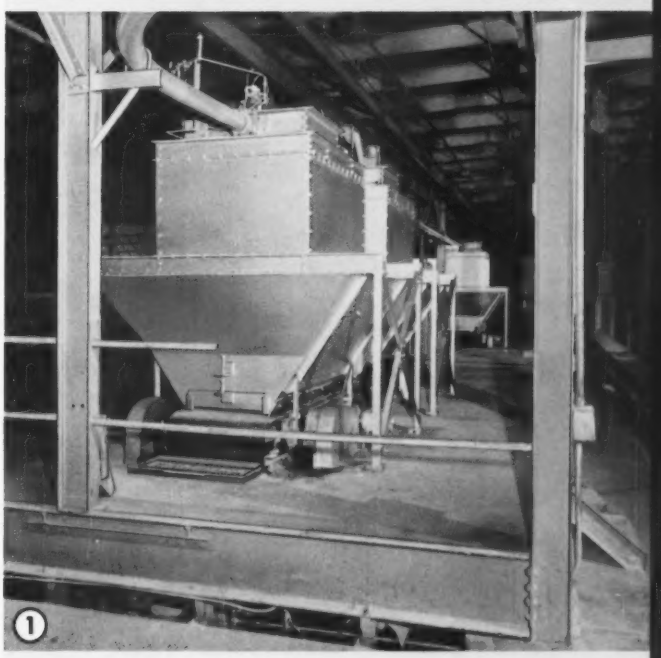
NATIONAL AIR CONVEYOR

(batch type)

For fast, flexible pneumatic transport of materials throughout the foundry.

Pilot unit demonstrates the competent engineering and the latest National patented components which make the National System efficient and trouble free:

- Two-way diversion valves
- Easy-open couplings
- No moving parts in Baffle Box
- Foundry experienced layout and engineering services
- Full follow-through for erection, parts and service



1

NATIONAL AIR CONVEYOR

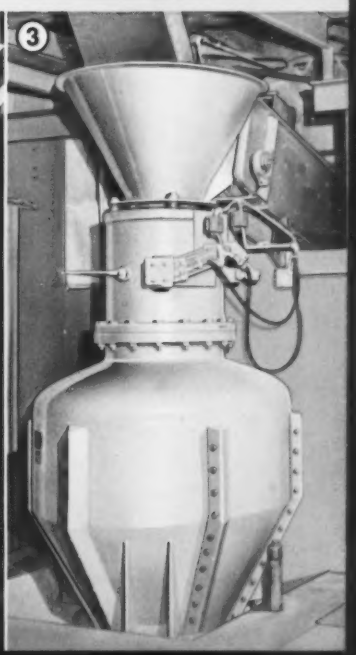
(continuous type)

Low cost system automates sand delivery and distribution.

This simple and completely versatile low cost system saved Studebaker Corp. foundry $12,950 in time, labor and maintenance costs in one year of operation.

- No moving parts, except blower
- Fully automated, continuous operation
- Occupies less than half the space of conveying equipment and elevators for equivalent work

2



3

Photos show: (1) System discharging to mill belt serving four refractory brick presses, (2) Compact, continucus transporter at Studebaker Corporation, (3) Batch system transporter handles 40 cu. ft. of granular bonded material per batch via versatile, minimum headroom "pipeline routing."

HITS THE ROAD IN 1960

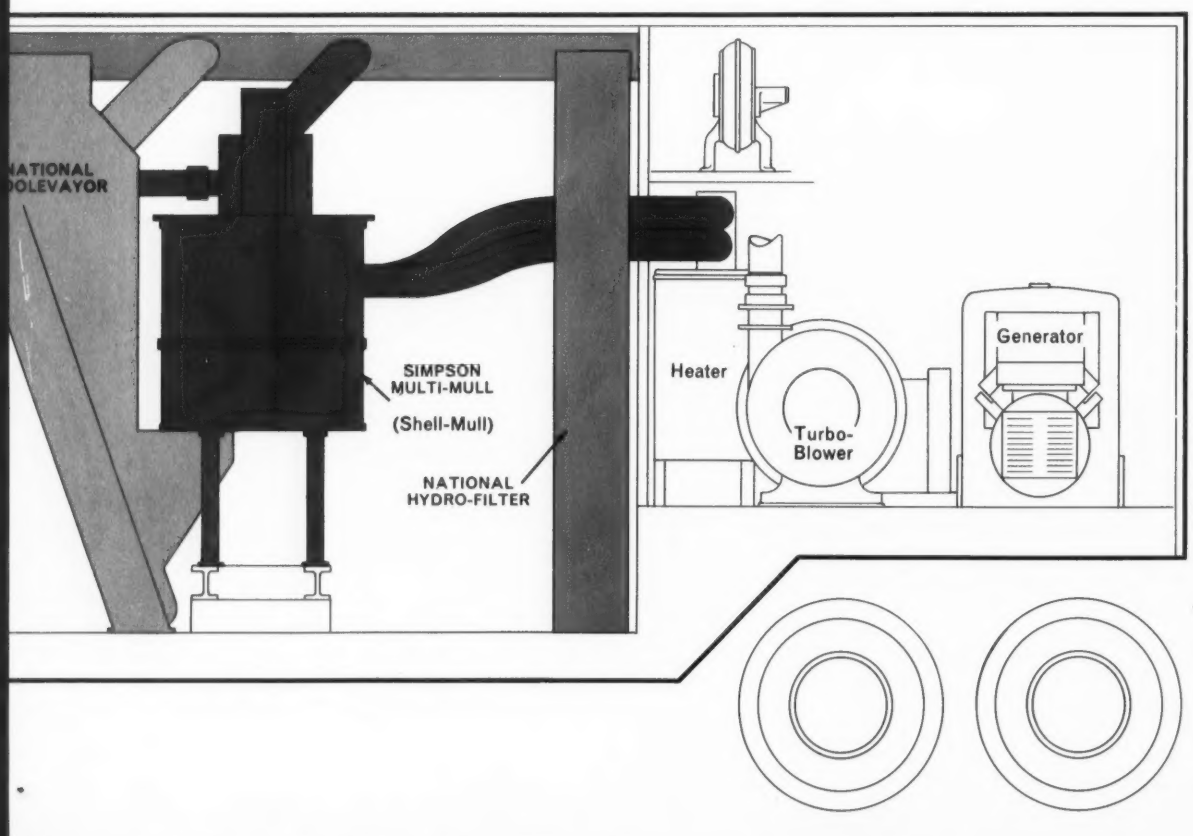
TO DEMONSTRATE THE LATEST FOUNDRY EQUIPMENT AND TECHNIQUES FOR: SHELL MOLDING MIXING SAND COOLING PNEUMATIC TRANSPORT SAND RECLAIMING

The Simpson Foundry Caravan is not an exhibit, not a show or movie. It is a full-scale sand conditioning pilot plant. Into this 37 foot trailer, National has incorporated a full size operating plant which includes the latest in National production and processing equipment.

The Caravan was designed and built to demonstrate . . . at *your* plant, with *your* sand . . . exactly how you can expect to improve the quality of your sand and increase the profitability of your foundry operation through the use of any one or all of these equipment items.

We invite you to be our guest during our stay in your area. The program is informative, instructive, and planned so that *you* can benefit from the experience which other foundries have had with this equipment.

For further details, on the Simpson Caravan and equipment, please return the card attached.



NATIONAL SHELL-MULL

For Controlled Coating

Consists of pre-heater, Simpson Multi-Mull, Coolevayor and screen. New Multi-Mull continuous mixer speeds up mixing time . . . insures most thorough and controlled mulling action available for resin-bonded formulas. Shell-Mull system affords:

- Uniform controlled coating
- High tensiles with low resin usage
- Low equipment costs
- Controlled hot air addition

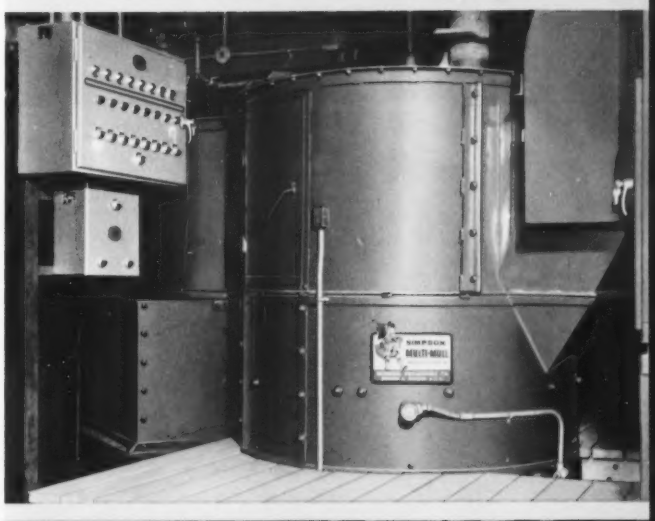
Hood equipped for air exhaust insures safety and provides quick access for charging and maintenance

SIMPSON MULTI-MULL

The only continuous muller!

This unique, high production unit lets you *mull* all the system sand you need *continuously*. It's National's 1960 *answer* to high production *plus* better, more uniform and more accurately controlled system sands. See these features demonstrated:

- High volume in small space
- Eliminates batching, mill hoppers and belts
- A size for every foundry need and purse



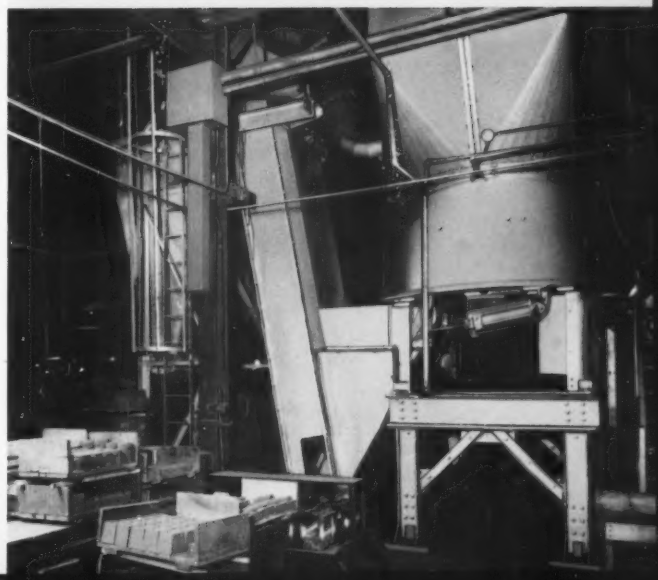
Multi-Mull at eastern foundry replaced pug mill. Occupies same floor area and space . . . with considerable increase in sand tonnage per hour.

NATIONAL COOLEVAYOR

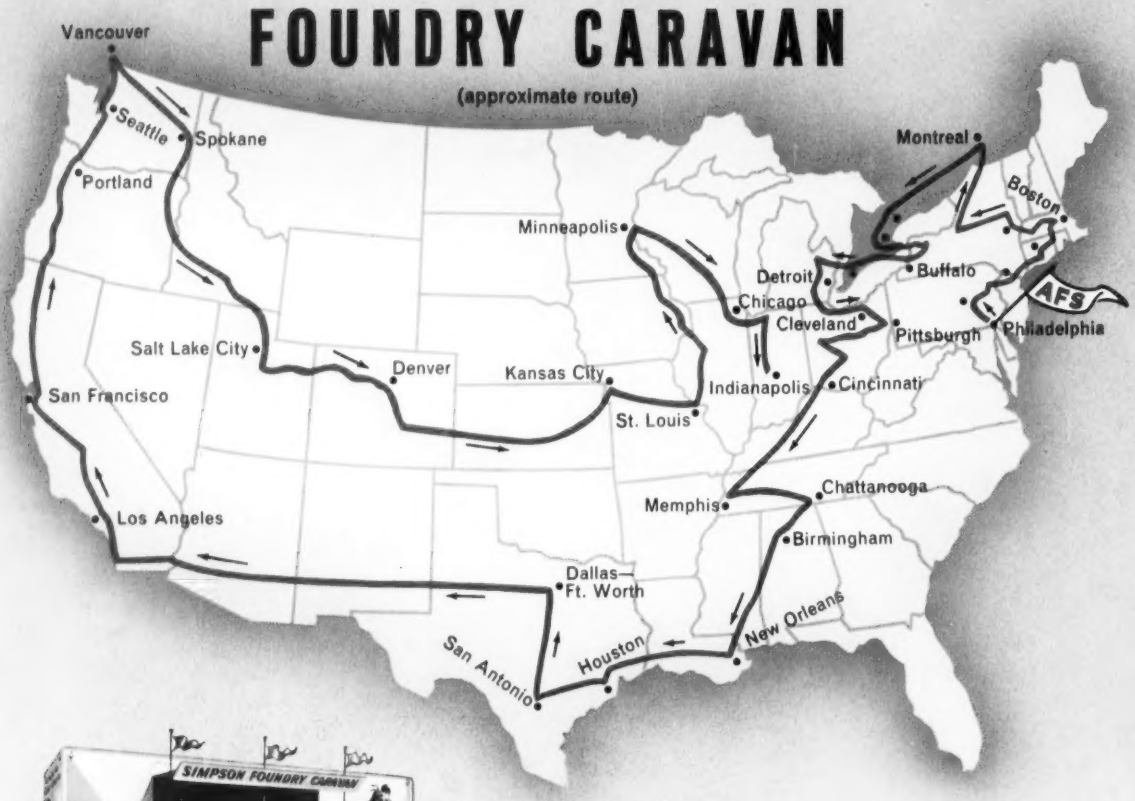
Lets you cool as you elevate and distribute!

Fast, efficient and compact, this unit cools and aerates a full charge from a mixer as it elevates and distributes sand to storage. Temperature drops from 200°—to within room temperature are possible.

- Use it as an elevator
- Use it as a conveyor
- Use it in *any* system



SIMPSON FOUNDRY CARAVAN



The most complete sand conditioning pilot plant on wheels

The National Caravan is completely self-contained in a 37 foot, generator-equipped trailer. The program includes a 15-minute "briefing"-showing equipment in use followed by demonstration of specific items of equipment using sand supplied direct from "host" foundry.

Stops in key foundry locations have been scheduled to permit a maximum number of foundrymen to see and make use of the equipment on their own materials.

The Caravan is staffed with competent engineers and technical personnel. All tests will be conducted under controlled conditions and a report submitted. Your local National representative will be in attendance to welcome you, to supervise equipment demonstrations and to help evaluate sand tests.

Return the card for further details.

DEMONSTRATIONS IN THESE KEY FOUNDRY CITIES

Philadelphia, Pa.
Eddystone, Pa.
Hamburg, Pa.
Reading, Pa.
Emmaus, Pa.
Bethlehem, Pa.
Phillipsburgh, N.J.
Hillside, N.J.
Harrison, N.J.
Branford, Conn.
Hartford, Conn.
Providence, R.I.
Hopedale, Mass.
Boston, Mass.
Worcester, Mass.
Springfield, Mass.
Pittsfield, Mass.

Albany, N.Y.
Schenectady, N.Y.
Syracuse, N.Y.
Montreal, Quebec
Toronto, Ontario
Hamilton, Ontario
St. Catharine's, Ontario
Rochester, N.Y.
Buffalo, N.Y.
Sarnia, Ontario
Saginaw, Michigan
Flint, Michigan
Detroit, Michigan
Ann Arbor, Michigan
Toledo, Ohio
Cleveland, Ohio
Pittsburgh, Pa.

Canton, Ohio
Massillon, Ohio
Mansfield, Ohio
Lima, Ohio
Columbus, Ohio
Cincinnati, Ohio
Memphis, Tenn.
Chattanooga, Tenn.
Birmingham, Ala.
New Orleans, La.
Houston, Texas
San Antonio, Texas
Dallas—Ft. Worth
San Diego, Calif.
Los Angeles, Calif.
Fresno, Calif.
Oakland, Calif.

San Francisco, Calif.
Portland, Oregon
Tacoma, Wash.
Seattle, Wash.
Vancouver, B.C.
Spokane, Wash.
Salt Lake City
Provo, Utah
Denver, Colo.
Pueblo, Colo.
Kansas City, Mo.
St. Louis, Mo.
Peoria, Ill.
Quad-Cities
Minneapolis, Mo.
Chicago, Ill.
South Bend, Ind.
Indianapolis, Ind.

NATIONAL ENGINEERING COMPANY
549 West Washington Blvd.
Chicago 6, Illinois

Printed in U.S.A.

Wipe Away

Lens Fogging and Dirt Problems Easily

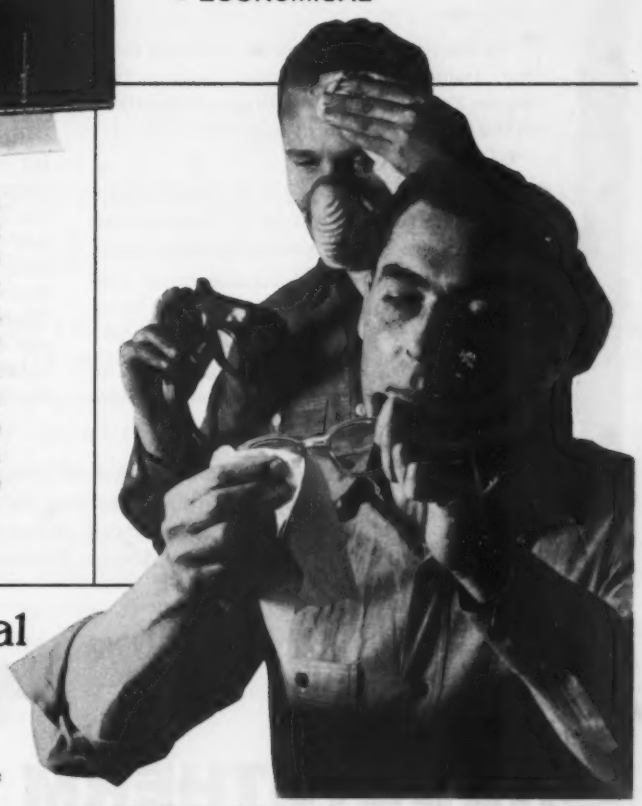
Here's one cleaning fluid dispenser that makes short work of cleaning glasses. It's made of heavy gauge steel — built to last for years. Cleaner provides *longest fog-free* hours of any on market. Dispenser comes with plunger type sprayer and pint bottle of fluid — contents last a long time between refills. This, and superior quality of 350AF ANTI-FOG mean real economy. When cleaning station door is closed, bottle is locked in place, thus eliminating pilferage. 350AF ANTI-FOG is also available in gallons and 2 oz. squeeze bottles. Test the durability of 350AF fluid. Send for free 2 oz. squeeze bottle and see for yourself — write Dept. 4634.

AO 851 Heavy Duty Cleaning Station with Dispenser (851MB) Attachment

- LONGEST FOG-FREE HOURS
- HANDY
- PILFER-PROOF
- ECONOMICAL

Station is supplied standard with inexpensive 851T wiping tissues (5″ x 8½″), 760 sheets per package, 18 packages per case. Paper has good tear resistance and wet strength yet is least expensive on market. Sheets are thriftily released 1 by 1 — reducing waste. Won't scratch plastics, won't leave lint.

Blurred vision breeds accidents! Keep glasses fog-free, clean and CLEAR with this handy equipment. Safety Service Centers in Principal Cities.



American Optical
COMPANY
SAFETY PRODUCTS DIVISION
Southbridge, Massachusetts
Safety Service Centers in Principal Cities
Always insist on Trademarked Safety Products

Your Surest Protection...AO SURE-GUARD Products

WHY BIG THINGS ARE HAPPENING IN INDUCTION MELTING

Everybody likes change! Particularly the kind of money-saving changes introduced by Inductotherm to induction melting in the past seven years.

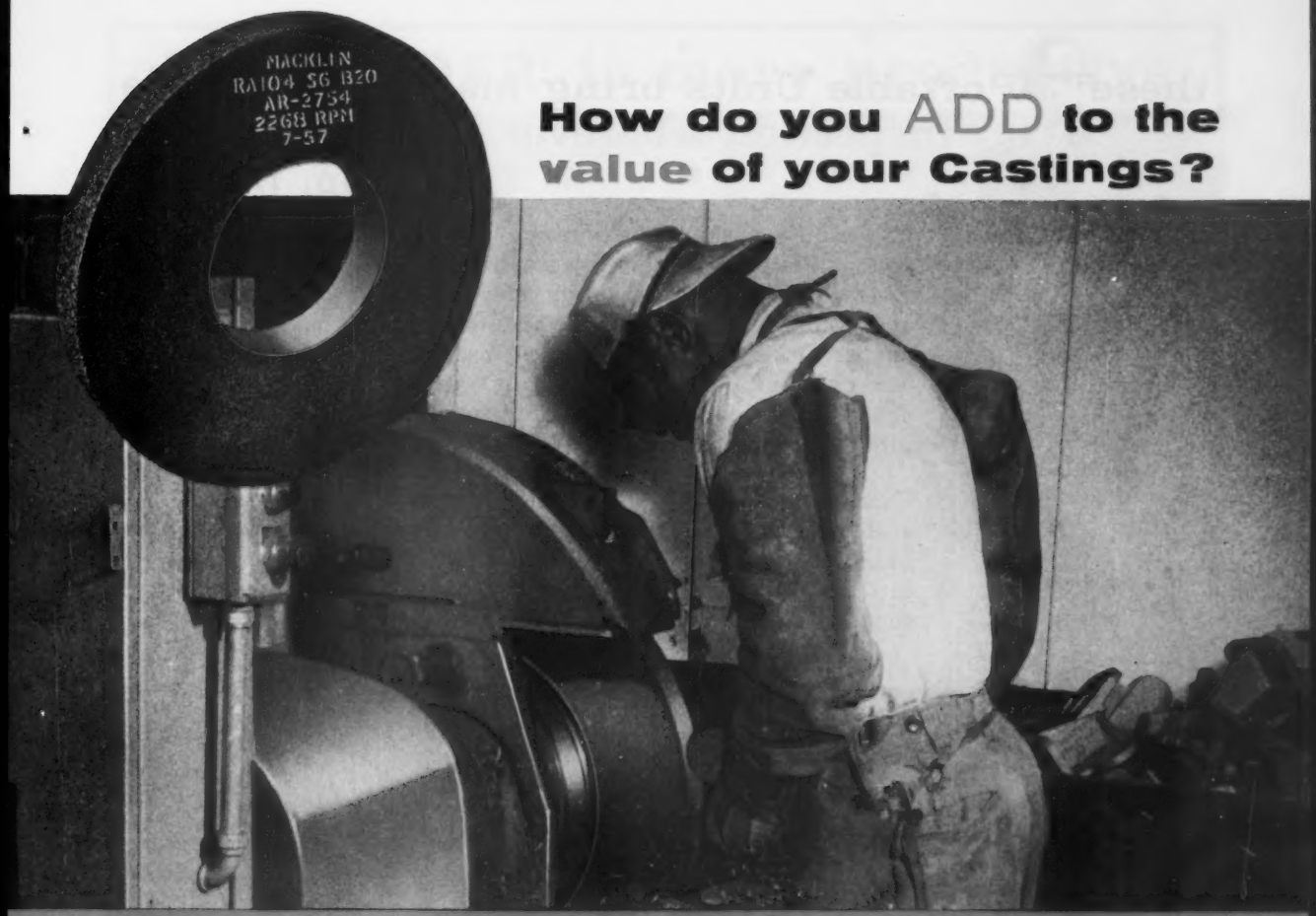
To the basic advantages of induction melting, Inductotherm has added features that assure lower costs by simplifying installation, speeding operation, and reducing service requirements.

- Inducto® power feed through tilting furnace trunions cuts the cost of pit construction; saves power losses by reducing cable length.
- Rigid, heliarc welded furnace frame construction improves furnace life and lining life.
- Prepackaged, pretested Inducto control centers take the time, trouble, and expense out of control installation; make start-up swift, sure, and easy.
- The most space-saving induction melting systems ever available are the Inducto "Integral" series, which package motor-generators, capacitors, transformers and all controls *in one compact console!*

Big things are happening in induction melting because Inductotherm is making them happen. But the biggest innovation has been the Inductotherm concept of service. Not just fast repairs and overnight replacement of any parts . . . but the fact that *Inductotherm is in business to fit induction melting to your needs.* We will do everything in our power to improve our equipment and the induction technique, never asking you to trim your requirements to the limitations of our equipment.

If you'd like more information on Inductotherm furnaces, write for Bulletin 70. But, for a taste of Inductotherm service, ask to have an engineer call. Inductotherm Corporation, 412 Illinois Avenue, Delanco, New Jersey.

INDUCTOTHERM **See Us At The FOUNDRY SHOW—Booth 224**



How do you ADD to the value of your Castings?

There's a MACKLIN *"wheel of Profit"* ..... that will do the Job!

WHETHER YOU SNAG CAST IRON, MALLEABLE IRON, OR NON-FERROUS CASTINGS, you snag more metal per dollar, keep your finished casting costs down, when you put Macklin snagging wheels to work in your cleaning room. Yes . . . grinding wheels do add value to your castings, and MACKLIN wheels add *more* at *less cost* to you.

On floor stands, portables, and swing frames, Macklin foundry wheels give cool, fast cutting. Long wheel life. They require less dressing, and hold corners better. And, Macklin's modern production techniques give users the closest possible wheel duplication, order after order.

LEADING FOUNDRIES REPORT...

Alloy nickel *"wheel cuts fast, finish is good."*

Steel Castings *"time per casting cut almost 4 minutes."*

Pearlitic iron *"cutting action very good. Long life."*

Cast iron *"wheel outlasted competitive wheel by 12 hours."*

YOUR MACKLIN DISTRIBUTOR WILL GLADLY ARRANGE AN ON-THE-JOB TEST, or write direct.

GRINDING WHEELS

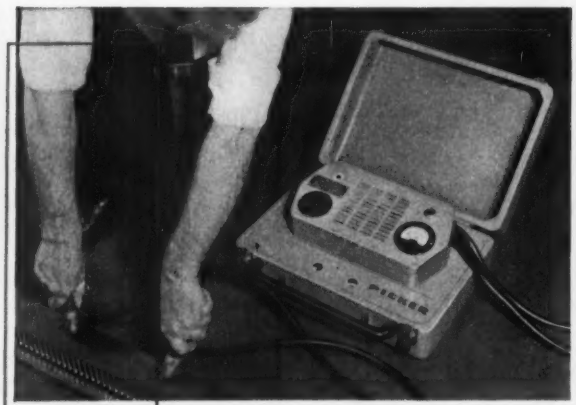
MACKLIN company • **Dept. 22** • **JACKSON, MICHIGAN**

Circle 633 on Page 53

these Portable Units bring magnetic particle inspection wherever needed . . . *in shop, in field*

Between them, this brace of magnetic particle units can solve many an inspection problem—maybe even one that's troubling you right now. Each, within its compass, has a capability approaching that of "big" machines. Each is light enough for one man to carry to the job. Each is self-contained: works efficiently off any 110 volt AC line. PORTAFLUX shines at some kinds of inspection jobs, FERROFLUX excels at others . . . depends on circumstances.

Talk it over with your local Picker man. He'll be glad to examine your situation, offer expert counsel and recommendations. (That holds for many other non-destructive inspection methods, too: he has a lot of them in his bag. The listing below suggests some of the ways in which Picker may serve you).



portaflux induces a magnetic field in the inspected object by passing a 500 ampere AC current through it. Provides *longitudinal* or *circular* magnetization with coil or prod technics to handle a wide variety of parts. The whole works—generator, control, prods and cable, pack up in a rugged aluminum case: total weight, ready to go, is only 60 lbs. Great for shop, aircraft, automotive maintenance inspection. Inspection of tools and dies, for fatigue cracks, etc. Inspection of turbine parts, small shafts, etc. in power plants. All this for only $500.00 complete (*price slightly higher in West*).

ferroflux is a powerful electromagnet which produces a magnetic flux in the area of the inspected part straddled by the magnetic poles. (Optionally available is a Variac voltage regulator for reducing or increasing flux.) Specially good for detecting subsurface defects because magnetic flux permeates object. No possibility of arc-damaging surface because no current passes through object. An excellent unit for inspecting welds in pipelines and pressure vessels and for detecting heat-treating and grinding cracks. Weight 30 lbs. All this for only $415.00. Variac voltage regulator $97.50 extra (*price slightly higher in West*).

PICKER . . . your ONE STOP for *non-destructive inspection equipment*

x-radiography	**ANDREX** portable x-ray units-140 KV, 160 KV, 200 KV, 260 KV **PICKER** x-ray units—35 KV Beryllium window, 90 KV, 110KV, 150 KV (stationary and mobile), 270 KV portable
gamma radiography	**PICKER** *Pipeliner*—30 curies, Ir^{192}, *Cyclops*—1500 curies; Co^{60} **TECH/OPS** Iridium^{192} units from 10 to 100 curies; Cobalt^{60} 3 to 100 curies: also Thulium^{170}, Cesium^{137}
fluoroscopy	**PICKER** Image Intensifier and associated equipment
magnetic particle	**PICKER** *Ferroscope* *Ferroflux* *Portaflux* **PIXmag** Ferropowders and pastes
dye penetrant	**PIXchek** Penetrants, Cleaners, Developers, and accessories

Picker x-ray

PICKER X-RAY CORPORATION
25 South Broadway, White Plains, N. Y.

PAYLOADER® is more productive

more digging and breakout power

Unusual digging power is only one feature of the H-25 that makes it the most productive tractor-shovel in its size range. Following are some of the other features and basic reasons why the H-25 "PAYLOADER" is outstanding in its class:

Full Power-shift Transmission with two speed ranges forward and two speed ranges reverse, plus matched, single-stage, two-phase torque converter.

Power-steering and the smallest turning radius (only 6 ft.) in its class.

Power-transfer Differential giving more reliable traction on slippery conditions by reducing drive-wheel spin-out.

Protected for Long Life by the most complete system of built-in insurance: oil filters; triple air cleaners; sealed hydraulic service brakes and enclosed parking brake; closed pressure-controlled hydraulic systems; oil and grease seals; other protective devices.

Whether your bulk-handling needs require the Model H-25 with 2,500 lbs. operating capacity, or larger tractor-shovels — up to 12,000 lbs. operating capacity — you'll find a "PAYLOADER" is the standard of *any* comparison. Your Hough Distributor is ready to prove it, and has the finest service and parts facilities in the business, backed by Hough factory service personnel.

* Two extra-large hydraulic cylinders develop the tremendous bucket breakout, tip-back force of 4,500 lbs. at the cutting edge — more than is available on any other machine in its size range.

HOUGH®

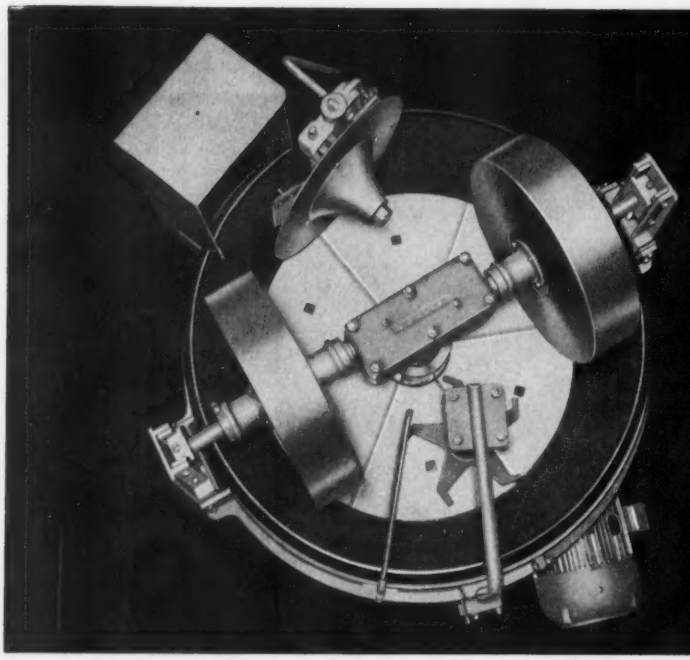
THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

☐ Send H-25 "PAYLOADER" data.

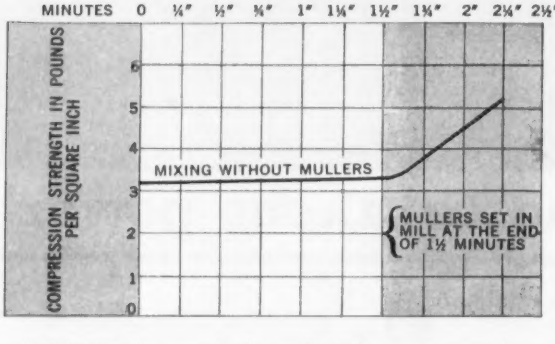
Name _____
Title _____
Company _____
Street _____
City _____ State _____

5-A-1



Muller Mixing Increases Sand Strength Greatly . . . Rapidly!

Sand Strength Curve Proves the Difference



This Strength Curve Chart demonstrates how much more effective muller mixing of sand is over regular scraper type mixing. In this test a Clearfield mixer was used to mix a charge of 91% burned sand, 3% bond and 6% water. At the start of the run the mulling wheels were removed completely . . . the batch was charged and the mixing operation continued for 1½ minutes with only the disc and agitator operating on the material. *There was only a slight increase in the strength of the sand.* Then the mullers were set into the machine and operation on the same batch continued for 1¼ minutes. During this very short period with the mullers operating, *the sand strength increased very rapidly.* You can speed production, with assured quality results—and cut costs too—with a Clearfield muller-type mixer. *Let us prove the superiority of Clearfield Muller-type Mixers with a sample run of your own batch. Just call us.*

WITH its speed, dependability and special mixing features, a Clearfield Mixer prepares your sand properly and exactly as you want it . . . thus paying for itself many times over. In addition to the strength-building mullers, Clearfield Mixers have other features that assure quality results every time. First, all Clearfield Mixers work on the rotating pan principle so that every particle in the batch is kept in continuous motion, with the ingredients alternately spread and gathered together to maintain highest mixing efficiency.

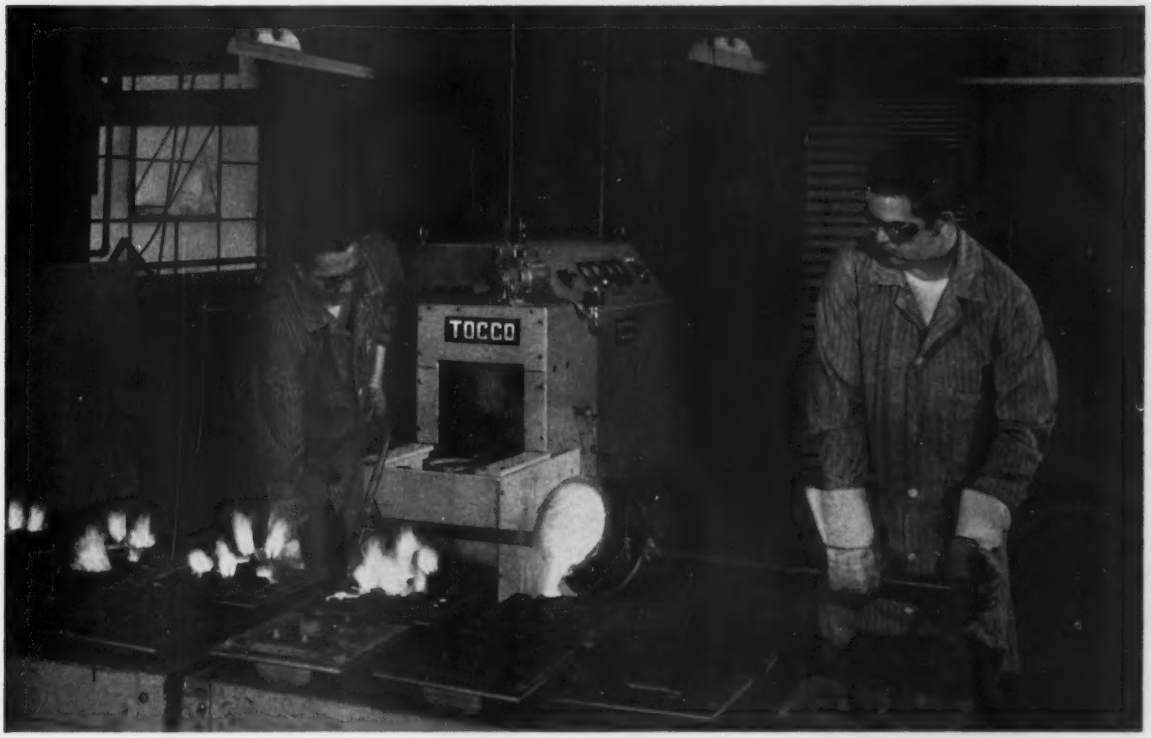
Another feature is the patented star-shaped agitator which covers the entire flat surface of the revolving bottom and prevents material from forming hard cakes or lumps. The agitator is driven automatically by the force of the sand being rotated by the pan motion; a "whirlpool" action is created, speeding up the mixing process and promoting clean emptying of the pan.

The Clearfield double-duty disc, also patented, cuts all the material free from the revolving pan rim at each revolution, turns it over and diverts a continuous roll of material under the mullers. (Moved to the discharge position, this disc unloads the complete batch in 15 to 20 seconds!)

You get thorough, proper blending and mixing when you use a Clearfield Mixer.

See the Clearfield Mixer in Action in booth 1002 at the AFS Foundry Show Convention Hall, Philadelphia, Pa. May 9-13

CLEARFIELD MACHINE COMPANY
CLEARFIELD, PENNSYLVANIA, U.S.A.



TOCCO* Induction Heating

melts bronze, aluminum and stainless steel for high-precision, porous-free castings

Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or nonferrous metals, TOCCO Induction Melting offers you these important advantages:

- **Stepless Power Control**
- **Extremely Rapid Melting**
- **High Efficiency—Even on Intermittent Operation**
- **Good mixing because of Natural Agitation**
- **Extremely Low Alloy Loss**
- **No Contamination when Composition of Charges is Changed**
- **High Reproducibility of Results**
- **Minimum Space Requirements**
- **No Special Installation Charge**
- **Simple, Safe Operation**
- **Clean, Comfortable Working Conditions**
- **No Carbon Pick-up**

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.

Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today— NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. F-5, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting".

Name_____

Position_____

Company_____

Address_____

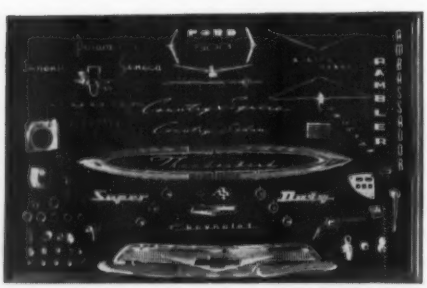
City_____ Zone____ State_____

Circle 637 on Page 53

50 million castings a year from these

PUTTING THE NEW CARS IN TRIM FOR READY SALES

At TRILEX MANUFACTURING CO., Wayne, Mich., this efficient battery of 14 KUX Hot Chamber Die Casting Machines (400- and 600-ton) is part of the complete Trilex facilities for modern die casting, fully automatic plating, finishing, and assembling.



KUX die casting machines

"THE PRIMARY concern of the major automobile manufacturers for die-cast trim parts is *quality*," says John Airey, president of Trilex Manufacturing Co., important suppliers in the automotive and appliance field. "That's why we have used KUX Die Casting Machines since 1945. They produce hardware finish quality castings.

"But along with quality," Mr. Airey continues, "auto makers as well as appliance men consider *price*. We've found that KUX machines can be depended on for minimum maintenance and minimum downtime. They put us in a better position to compete on a cost-per-unit basis."

Whether your main concern is lower production costs, higher quality or both, investigate the advantages of KUX Die Casting Machines. 28 all-new strain gauge proven KUX models, 50 to 2000 tons, for both hot or cold chamber operation, available with automatic cycling mechanism and KUX patented "Vac-U-Die" and "Auto Feed" systems of vacuum die casting.

Write for full details of the 28 all-new KUX models illustrated in the latest KUX Die Casting Machine Catalog.

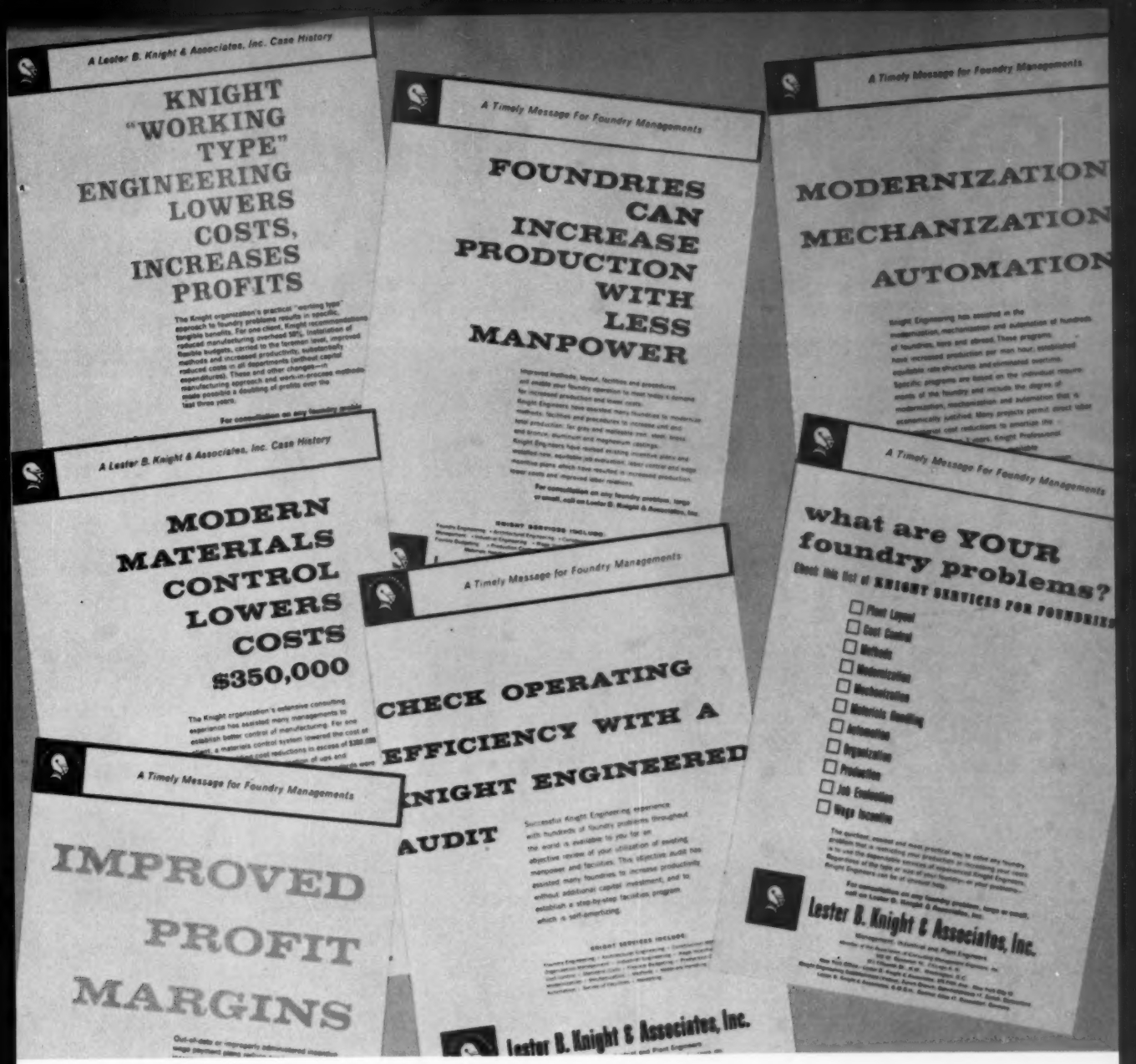
KUX

MACHINE CO.

6725 North Ridge Avenue, Chicago 26, Illinois

Circle 638 on Page 53

Circle 639 on Page 53→


A Lester B. Knight & Associates, Inc. Case History
KNIGHT "WORKING TYPE" ENGINEERING LOWERS COSTS, INCREASES PROFITS
A Timely Message For Foundry Managements
FOUNDRIES CAN INCREASE PRODUCTION WITH LESS MANPOWER
A Timely Message for Foundry Managements
MODERNIZATION MECHANIZATION AUTOMATION
A Lester B. Knight & Associates, Inc. Case History
MODERN MATERIALS CONTROL LOWERS COSTS $350,000
A Timely Message for Foundry Managements
what are YOUR foundry problems?
A Timely Message for Foundry Managements
CHECK OPERATING EFFICIENCY WITH A KNIGHT ENGINEERED AUDIT
A Timely Message for Foundry Managements
IMPROVED PROFIT MARGINS
Lester B. Knight & Associates, Inc.

Whatever castings you produce...
Whatever your foundry problem...

call on Knight engineering

for increased production and

Here is the wide scope of Knight services utilized in the successful completion of foundry assignments ranging from the solution of a single problem in one department to the layout, design and supervision of construction of complete new plants.

FOUNDRY ENGINEERING Complete surveys of plants to establish the basic requirements for modern, low-cost operation. Knight Engineers become, temporarily, a part of the client's organization to make a comprehensive, objective analysis and, with the client's staff, develop the most modern methods and facilities. The result always is a better solution than either group could develop separately.

ARCHITECTURAL ENGINEERING Undivided responsibility, from drawing board to completed plant, has insured savings in time and money. Knight experience has helped to improve working conditions in a simple, functional plant designed for foundry operation. Knight has a complete and experienced mechanical, electrical, structural and architectural staff who have supervised the design of hundreds of millions of dollars of industrial plants.

CONSTRUCTION MANAGEMENT After plans have been approved, Knight has acted as the client's representative to supervise construction at minimum cost. This has included supervision of "cost-plus" as well as fixed price contracts. The saving in time and money is far greater than the cost of complete construction management service.

FOUNDRY MODERNIZATION Modern methods, facilities, controls, rigging and operating techniques can and must be used by all foundries to insure low cost, profitable operations with high take home pay, low unit costs and adequate return.

FOUNDRY MECHANIZATION The degree and type of mechanization should be established for each requirement. The simplest unit of rugged design and construction to insure minimum maintenance is a must. Over-mechanization should be avoided.

MATERIALS HANDLING By proper plant layout and handling methods, manual handling has been reduced to a minimum. The ideal, of course, is to perform an operation on the material each time it is handled. In the foundry from 100 to 400 tons of material are handled to ship 1 ton of castings.

AUTOMATION Automation can and must be applied in foundries to the degree justified by the particular problem. Knight engineered the first fully automated unit producing 272 molds per hour, 16 hours per day. Many other operations have been established on semi and fully automated cycles. Each problem is a study in itself to establish its economic justification.

experience

lower unit cost

SURVEYS Knight-engineered audits of operations can assist you to establish the changes necessary to secure maximum utilization of facilities and manpower—and thus maintain the most efficient, low-cost operation.

MARKETING Knight has surveyed markets to establish the availability of work suitable for a particular foundry and the type of facilities to be established.

FOUNDRY MANAGEMENT Knight has reorganized, refinanced and operated foundry businesses successfully and temporarily directed operations in one or more departments for short periods to establish low cost operations.

FOUNDRY ORGANIZATION Knight has established simple organization programs pinpointing responsibility and authority, providing proper communication between various functions and providing complete administrative and procedure manuals to make certain that all are familiar with policies and each understands his job.

INDUSTRIAL ENGINEERING These services have included establishment of standards for incentive wage payment plans to insure a full day's work for a full day's pay, labor contract negotiations, establishment of basic data for estimating, cost and labor control, preventive maintenance programs and plant layout, and protection.

METHODS Knight engineers have completed analyses of methods to reduce time and motion to a minimum and to establish the most efficient rigging to permit full utilization of existing personnel and equipment. A method study should always be tied in with establishment of incentive wage plans.

COST CONTROLS & BUDGETS The Knight organization has installed cost systems in more than 100 manufacturing plants, including foundries, to establish better and simple controls, "highlight" inefficiencies and establish budget goals for all levels of supervision and management. Every foundry must know its costs to insure continued profitable operation, competitively. A periodic review or audit by Knight Engineers insures that this "tool" of management is kept up to date.

PRODUCTION CONTROL Delivery promises always are important and sometimes critical. Systematic production scheduling and control based on known factors requires a minimum of people and insures a minimum of missed shipping dates.

A PARTIAL LIST OF CLIENTS

- **Acindar, S.A.**
  Buenos Aires, Argentina
- **Acinfer, S.A.**
  Villa Constitucion, Argentina
- **Alloy Steel Products Co.**
  Linden, N. J.
- **American Brake Shoe Company**
  Chicago and St. Louis
  Buffalo and New York
- **American Malleable Castings Co.**
  Marion, Ohio
- **American Radiator & Standard Sanitary Corp.**
  Baltimore and Louisville
- **Appleton Electric Company**
  South Milwaukee, Wisc.
- **Belle City Malleable Iron Company**
  Racine, Wisc.
- **Bergische Stahlwerke A.G.**
  Remscheid, Germany
- **Buckeye Steel Foundry Co.**
  Columbus, Ohio
- **Buderus 'sche Eisenwerke**
  Essen, Germany
- **Canadian Car and Foundry Company, Ltd.**
  Montreal, Quebec
- **Chrysler Corp.**
  New Orleans, La.
- **C. K. D.**
  Blansko, Czechoslovakia
- **James B. Clow & Sons Co.**
  Birmingham, Ala.
- **Combustion Engineering, Inc.**
  Chattanooga, Tenn.
- **Crane Co.**
  Chicago and Chattanooga
- **Cummins Engine Company, Inc.**
  Columbus, Ind.
- **Dalton Foundries, Inc.**
  Warsaw, Ind.
- **Dayton Malleable Iron Co. (3 plants)**
  Dayton, O.
- **Der Stahl- und Temperguss A.G.**
  Traisen, Austria
- **Dominion Foundries & Steel Limited**
  Hamilton, Ontario
- **Electric Steel Foundry Company**
  Portland, Ore.
- **Erie Malleable Iron Company**
  Erie, Pa.
- **Fahralloy Canada Limited**
  Orillia, Ontario
- **Fairbanks, Morse & Co.**
  Kansas City, Kan.
- **Federal Malleable Co.**
  Milwaukee, Wisc.
- **General Railway Signal Company**
  Rochester, New York
- **General Steel Castings Corp.**
  Eddystone, Pa.
- **Goetzewerke A/G**
  Burscheid, Germany
- **Gunite Foundries Corporation**
  Rockford, Ill.
- **Hammond Brass Works**
  Hammond, Ind.
- **Hardinge Company, Inc.**
  York, Pa.
- **Hauts-Fourneaux et Fonderies**
  Halbergerhutte
  Brebach (Sarre), Germany
- **Haynes Stellite Company**
  Kokomo, Ind.
- **Hershey Corporation**
  Havana, Cuba
- **Ilva**
  Genoa, Italy
- **A. Y. McDonald Manufacturing Co.**
  Dubuque, Iowa
- **Mannesmann-Meer A.G.**
  Munchen, Gladbach, Germany
- **Marion Malleable Iron Works**
  Marion, Ind.
- **Moline Malleable Iron Company**
  St. Charles, Ill.
- **Mueller Co.**
  Decatur, Ill.
- **National Roll & Steel Foundry Co.**
  Avonmore, Pa.
- **Ohio Injector Co.**
  Wadsworth, Ohio
- **OPW Corporation**
  Cincinnati, Ohio
- **Pittsburgh Steel Foundry Corporation**
  Glassport, Pa.
- **The Plainville Casting Company**
  Plainville, Conn.
- **Ransohoff, Inc.**
  Hamilton, Ohio
- **Rheinstahl Eisenwerke**
  Gelsenkirchen, Germany
- **Scullin Steel Company**
  St. Louis, Missouri
- **Sibley Machine & Foundry Corp.**
  South Bend, Ind.
- **Spojene Tovarny Na Obrabeci Stroje**
  Brno, Czechoslovakia
- **Stavanger Electro-Staalverk A/S**
  Jorpeland, Norway
- **Stockey & Schmitz**
  Gevelsberg, Germany
- **Stockham Valves & Fittings**
  Birmingham, Ala.
- **Sulzer Bros. Ltd.**
  Winterthur, Switzerland
- **Superior Steel & Malleable Castings Co.**
  Benton Harbor, Mich.
- **The Symington-Gould Company**
  Division of Symington-Wayne Corp.
  Depew, N. Y.
- **Universal Castings Corporation**
  Chicago, Ill.
- **Wagner Castings Company**
  Decatur, Ill.
- **Walworth Company**
  Kewanee, Ill. and Boston, Mass.
- **Wellman Bronze & Aluminum Co.**
  Cleveland, Ohio
- **Woodruff & Edwards, Inc.**
  Elgin, Ill.
- **Worthington Corporation**
  Harrison, N. J.

We will be pleased to talk specific cases with you, at your convenience.

Lester B. Knight & Associates, Inc.

Management, Industrial and Plant Engineers

Member of the Association of Consulting Management Engineers, Inc.

549 W. Randolph St., Chicago 6, Ill.

New York Office—Lester B. Knight & Associates, Inc., Management Consultants, 500 Fifth Ave., New York 36

Knight Engineering Establishment (Vaduz), Zurich Branch, Dreikonigstrasse 21, Zurich, Switzerland

Lester B. Knight & Associates, G.M.B.H., Berliner Allee 47, Dusseldorf, Germany

Readers' Comment

A Foundry In the Making

DEAR MR. LEE:

I read with interest your "Man to Man" in FOUNDRY. I would say that the cartoon of you and the junk (February issue) is a masterpiece.

I have always had a burning desire to melt up some metal and make a casting. My son is now 14 and has the same desire. We are setting up a small shop for him, and have everything except the know-how relative to making some castings. We wish to start off with aluminum since we accumulate a lot of scrap from a punch press. We have several books and get FOUNDRY regularly.

I would like to buy or build a small electric furnace for melting aluminum. Any information that you may give us will be appreciated.

I have been manufacturing souvenir merchandise here at Lake Ozark, Mo., since 1935. We make several specialty items and aluminum stampings for our own use. Under separate cover I am mailing you a few of our souvenir items which you may look over and then store with your collection of items that are no good to use, but too good to dump.

Reminds me of the story of the deceased old lady. When relatives were dividing up her belongings, they came to a large bag of string. On the bag was written, "string too short to use."

LON STANTON

Stanton Novelty Co.
Lake Ozark, Mo.

Ralph Lee's Prescription

DEAR MR. STANTON:

It was good to hear from you, to learn of your most interesting business and your urge to do a bit of foundry work. I wish I had something all prepared for giving you a step-by-step procedure for building and using a small nonferrous melting outfit, but unfortunately I haven't.

I'm afraid that an electric furnace would be both expensive and awkward to control. We use natural gas, although artificial will suffice.

Starting with the size crucible you intend to use (ours is No. 10), you shouldn't have too much trouble designing and building a practical unit. We use a small heavy-gage garbage pail as the outside shell. It's set up off the floor on channel iron legs and lined with insulation and rammed in place refactory—as also is the lid except for a vent hole in the center.

The lid, after being raised high enough to clear the top of the furnace, swings out of the way.

The blower saw better days as a vacuum cleaner. The discharge side is rigged up with a pipe connected to the furnace, projecting through the refractory and equipped with a damper. Gas is introduced through a ¼-in. ID tube projecting into the air pipe and between the damper and the furnace. A brass cock controls the gas. You'll probably have to fiddle around a bit to get the right mixture, taking care not to singe the old whiskers, blow up the place, or succumb to carbon monoxide. You should have a vent to the outside.

The crucible rests on a piece of fire brick called a stool. Oh yes! The gas and air mixture comes into the furnace tangentially.

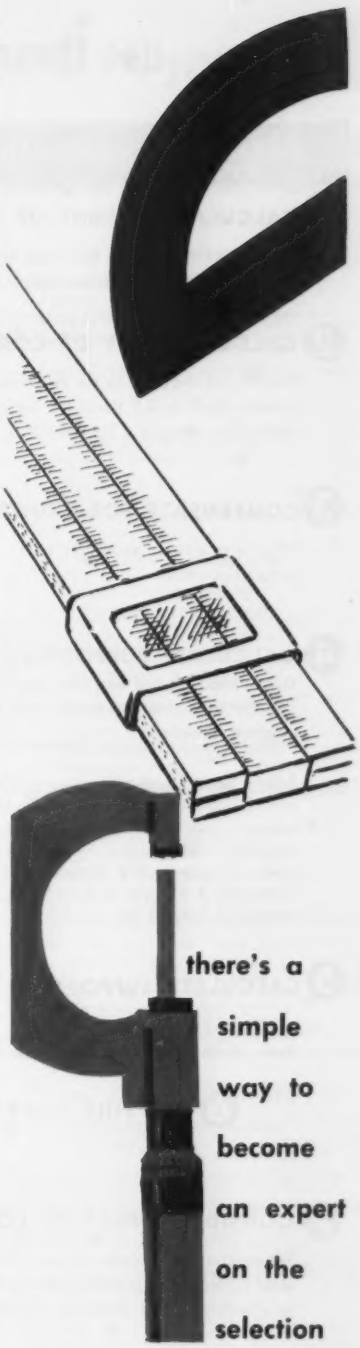
I suggest that before you do anything you get on the good side of an experienced foundryman, show him my letter and tell him Groucho sent you. Another thought: Start off by buying your metal, then work your way up to refining scrap which, however, is quite a trick. In fact, you might end up by selling your scrap and buying remelt. That's what we do.

You appreciate, I'm sure, that we're barely scratching the surface. Several volumes would be required to cover the subject. Patience will be an indispensable ingredient.

RALPH L. LEE

Lee Hobby Foundry
938 Lakeside Rd.
Birmingham, Mich.

P. S.—I've had so many requests for information, such as yours, maybe I'd better make up a few of these



there's a simple way to become an expert on the selection of chaplets

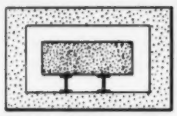
SEE NEXT PAGE . . .

use these handy FANNER selection charts to

FACTORS TO CONSIDER IN SELECTING CHAPLETS

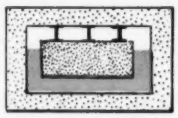
1 CALCULATE WEIGHT OF CORE

Purpose of chaplets in the drag side of mold is merely to hold core weight until metal is poured. Core weight = .06 lbs. per cu. Inch of Core



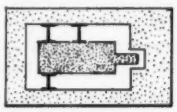
2 CALCULATE LIFT OF CORE

Purpose of chaplets in the cope side of mold is to withstand lift exerted by metal, which is 3.5 times the weight of the core for grey iron and 3.9 for steel. Core weight x 3.5 or 3.9 = Lift of Core



3 COMPENSATE FOR PRINTS AND SUPPORTS

Where prints or supports exist, load calculations should be reduced proportionately.



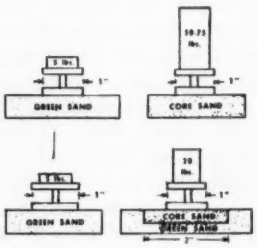
4 CALCULATE SUPPORTING CAPACITY OF SAND

Green sand in cope and drag will support approximately 5 lbs. per Sq. Inch. To determine required head area, divide load by 5 lbs.

$$\frac{\text{Load on Chaplet}}{5 \text{ lbs.}} = \text{Sq. Inches of Chaplet Head Area Required}$$

Baked Sand Cores will support 50 - 75 lbs. per Sq. Inch. To determine required head area (or bearing surface), divide load by 50 - 75 lbs.

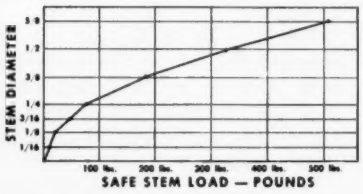
Where cores are so heavy that an excessive number of chaplets would be required, **ram-up** cores may be used to increase the bearing surface of green sand. For example: A chaplet with 1" head in green sand will support only 5 pounds. A 2" ram-up core (4 Sq. Inches) will provide a bearing surface to support 4 times 5 lbs., or 20 lbs.



5 CALCULATE SUPPORTING CAPACITY OF SAND

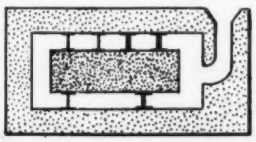
$$\frac{\text{Required Head Area (Sq. In.)}}{\text{Area of Each Chaplet Head (Sq. In.)}} = \text{Number of Chaplets Required}$$

6 USE THIS CHART TO CHECK SAFE LOAD ON STEM



7 CONSIDER EFFECT OF LOCATION AND TEMPERATURE

When chaplet location is near the gate (heavy flow of metal), or, when steel is poured at high temperatures, allow up to 50% additional stem size to compensate for effect on chaplet.

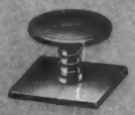
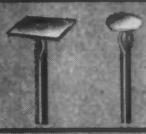
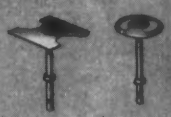


The chaplet you select for any casting can make a great difference in its quality . . . and in its overall costs. Too light or too small a chaplet may result in improper core support and a poor casting, too large or too heavy a chaplet increases chaplet costs unnecessarily. Use this graphic information to determine the correct chaplet to insure proper core support.

Write for free plastic laminated selection chart of chaplets.

insure proper selection of proper type of chaplets for your job

fine FANNER CHAPLETS are made in a wide range of types for every need

TYPE	CHARACTERISTICS	APPLICATIONS
MOTOR	FUSE READILY STEMS CAN BE GROOVED HEADS CAN BE PERFORATED HEADS CAN BE TILTED STEMS CAN BE EXTENDED CLOSE TOLERANCES ±.002	***For Light Sections of*** **Motor Blocks • Heads • Housings Radiator Sections • Burner Sections • Pump Sections • Farm Equipment • Job Castings**
BUTTON HEAD OR BOILER 	STURDY STRUCTURE FUSE READILY STEMS CAN BE GROOVED NON-SLIP BUTTON HEAD	***For Boiler Sections***
PERFORATED	10 STANDARD SHAPES MADE TO FIT ALL CONTOURS MADE TO ALL RADII DESIGNED FOR WEDGES LOW IN COST	***For Light Sections of*** **Stove Castings • Motor Castings • Job Castings**
DOUBLE HEAD	STURDY STRUCTURE STRONG SUPPORT TO CORE STEMS CAN BE GROOVED HEADS CAN BE CANTED RIVETED OR WELDED HEADS CLOSE TOLERANCES ±.005	***For Heavy Sections of*** **Machine Tool Bases • Diesel Engines • Locomotive Frames Side Frames • Pumps • Road Machinery**
SINGLE HEAD 	NON-SLIP FORGED HEADS FITTED HEADS WITH ANY RADIUS SOLID SUPPORT	***For Very Heavy Cores of*** **Diesel Engines • Machine Bases**
RADIATOR	UNIFORM BREAK-OFF NICKS DEEP NICKS FOR FIRM KNITTING LOW COST	***For Radiator Sections*** **Burner Sections • Pump Sections Farm Equipment • Job Castings**
SHOULDER RADIATOR 	EASY TO PLACE FUSE READILY DEEP BREAK-OFF NICKS STAGGERED NICKS FOR FIRM KNITTING UNIFORM SHOULDERS	***For All Thin Sections of*** **Manifolds • Stove Burners Cylinder Heads**

SPECIFY FANNER GROOVESTEMS TO ELIMINATE LEAKERS

Your best insurance against faulty castings is the GROOVESTEM chaplet with the Countersunk Shoulders, Featheredge Fusion Rings, and Complete Contact Radius Grooves.

When you need chaplets remember that only FANNER makes a complete line for every casting requirement. Regardless of the kind of metal you pour or the type of casting you produce, you can secure the exact chaplet you need from this one source. As a result you always save time . . . reduce costs . . . step-up production when you standardize on FANNER for all your needs.

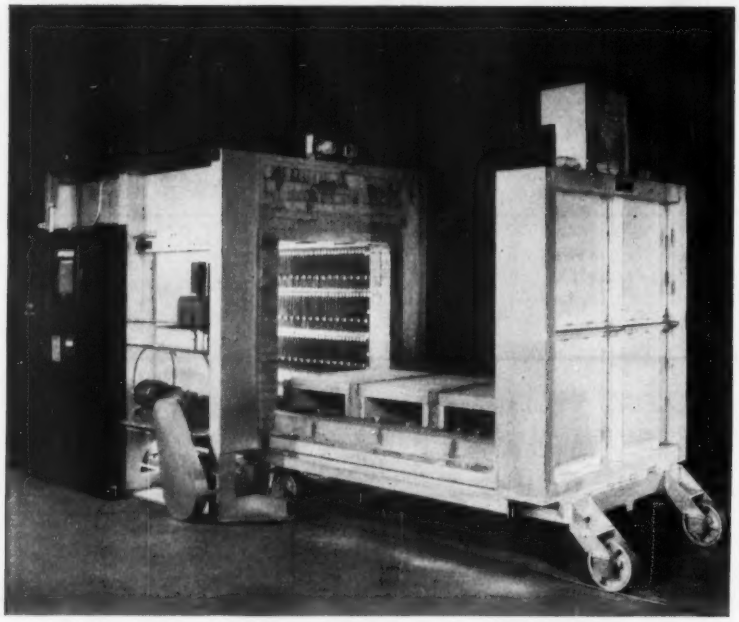
THE **FANNER** MANUFACTURING COMPANY

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

Circle 640 on Page 53

LOOK . . . no rails needed and installation costs cut when you buy this new Waltz furnace



This new WALTZ electric car bottom furnace, 3' wide x 3' high x 6' long, completely eliminates expensive installation of rails, etc. It is in wide usage in plants where heat treating facilities are above the first floor. Rigid and sturdy construction gives years of usage. Ball bearing wheels for easy operation. Furnace has 12" lining of insulation, heating elements on side walls, rear wall, door, and top of car. Many other typical Waltz features make this special car bottom furnace a wise investment. All technical details, etc., are included in an illustrated 33 page book available free on request.

Waltz Furnace Company
Dept. E, 1901 Symmes St., Cincinnati 6, Ohio
Please send me without obligation this new 33 page illustrated book, with photos and technical description of this furnace and 13 other WALTZ car bottom furnaces.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

Waltz FURNACE COMPANY
Symmes Street • Cincinnati, Ohio

furnaces for foundry nuts such as you. Came near forgettin'; the blower motor is hooked up in series parallel with electric light bulbs serving as variable resistance which gives you almost any blower speed you wish.

He's In Business

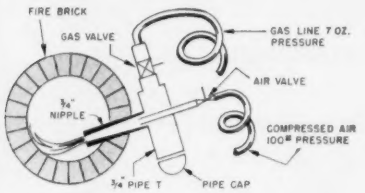
DEAR MR. LEE:

We are in the foundry business. Since writing you we built a furnace as per your instructions, and it works.

We use butane gas with compressed air. From a cold start we are ready to pour aluminum in 25 minutes.

Accompanying is a sketch of our burner. It's hotter than hot.

We have a lot to learn but have



never had so much fun. Thanks again for your assistance. Don't forget if you are ever in this part of the country we would surely enjoy showing you around our Lake of the Ozarks, which has a longer shore line than Lake Michigan.

LON STANTON

P. S.—We heat with bottle gas—which makes it work out fine.

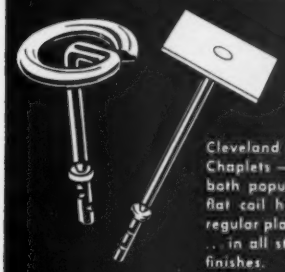
It Has To Be Sold

TO THE EDITORS:

Your March editorial is so appropriate today, it is difficult to resist commenting on it.

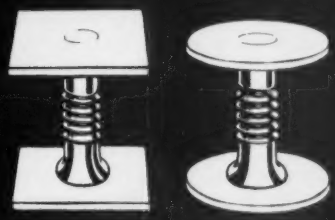
Almost any successful foundryman today would agree that the various casting trade associations are invaluable to their respective foundries, but there is a point where what the individual association has to offer ends and the member foundry must take over. This certainly applies to an individual foundry's casting sales and the preliminary promotional efforts.

Our company has promoted itself and its product for many years and this promotion has increased steadily, both in coverage and financial outlay. We feel it's a must. Contrary to sometimes popular belief, castings *don't* sell themselves. Stew-



Cleveland Radiator Chaplets — include both popular open flat coil head and regular plate heads . . . in all styles and finishes.

Motor Chaplets — made with annular fusion rings for uniform knitting and maximum core support; also with wide radius shoulders that eliminate gas-collecting voids under the heads.



Double-Head Chaplets — used for heavier metal sections, these chaplets are accurately made of low carbon steel and carefully tinned. Also produced in heavy and extra-heavy sizes.

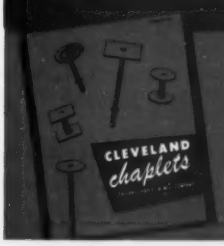
Super Chills and Regular Curved Chills — accurately equalize cooling rates of thick and thin casting sections . . . eliminate shrinks. Complete line . . . black, copper or tin coating.

one source for all your chaplet and chill needs . . .

plus CLEVELAND'S

- QUALITY
- ECONOMY
- SERVICE

Enjoy high casting quality every time with Cleveland Chaplet's popular precision-made and accurately finished chaplets. Here's accurate core support that helps hold down molding and cleaning costs, simplifies your inventory, too, because you can rely on Cleveland's prompt, dependable service.



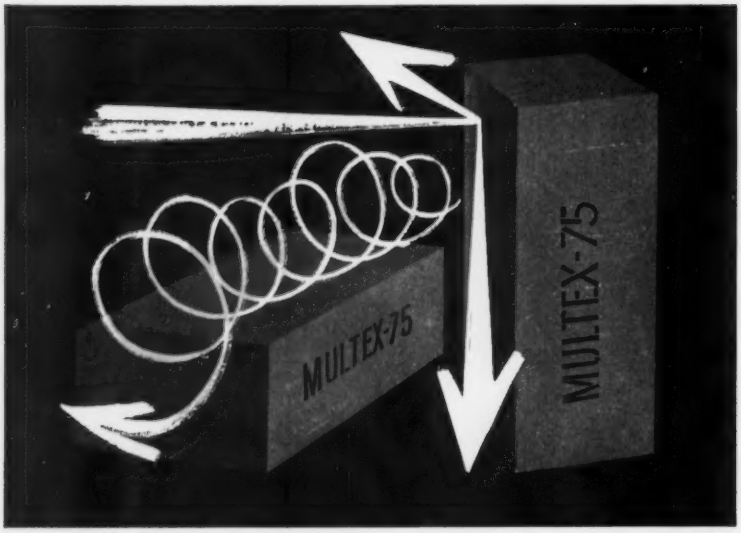
For chaplet detail... request Cleveland's up-to-date catalog TODAY!

CLEVELAND *chaplet* **SINCE 1890**

AND MANUFACTURING CO.

26470 Lakeland Ave. Cleveland 32, Ohio

For aluminum furnaces



New Porter Multex-75 resists the impact and abrasion of hard charging

Porter Multex-75 is the new, *tough* alumina refractory that defies the "*rough-and-tumble*" action of continuous hard charging.

Tough? Multex-75 can't be effectively cut with anything *less* than a diamond wheel. Add to that the other benefits—low metal loss from "wetting," virtually no "growth," *easily* removed oxides—and you have an A-1 aluminum refractory. *The price of* Multex-75 *alone, is an open invitation to try it!*

PORTER REFRACTORIES FOR ALUMINUM INDUSTRIES

Porter continues to lead the field in better refractories for aluminum, with:

Multex 75—75% Alumina Refractory Brick
Multex 85—85% Alumina Refractory Brick
Aluram 85—85% Alumina Ramming Mix—heat setting
Aluram 85P—85% Alumina Ramming Mix—air setting
Multex Mortar—Bonding Mortar for Multex 75 and 85
Pitco 80—80% Alumina Plastic Refractories

For technical counsel or product information on *any* aluminum refractories application, write: *Refractories Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.*

REFRACTORIES DIVISION

PORTER

H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

ing in our own self-satisfaction never helped us.

What prompted me to write this is the frequency with which I run across fellow foundrymen who feel that organized sales promotion and advertising programs are a waste of money.

Foundry trade associations have been crying "promotion" for sometime, but as a relatively young foundryman with a lot of enthusiasm, I was rather surprised to observe the lack of enthusiasm displayed by many individual foundries for self-promotion.

There's a timeworn philosophy actively followed at Hamilton Foundry today, and long before I was born, that very simply says "You've got to spend money to make money." Future castings sales depend on spreading this money around to let customers and potential customers know you exist and that you can possibly do just a little bit better job than your competitor. We're sold on it. And we honestly wish our competitors were, too, since it would upgrade the entire castings industry and would result in many mutual benefits for all foundries.

So I agree, as you said, "It's Up To You" and to us, and to our competitor down the street, and to his competitor down the street. Foundrymen are unique in many ways, but their is nothing so unique about a gray iron casting that says it doesn't have to be sold.

PETER R. RENTSCHLER
Vice President

Hamilton Foundry Inc.
1551 *Lincoln Ave.*
Hamilton, Ohio

Process Is Patented

TO THE EDITORS:

The article entitled "Heat Treatment of Pearlitic Malleable Iron" appearing in the April, 1960, issue of FOUNDRY describes a process for treating castings using carboxyl methylcellulose in water as a quenching medium. This process was invented by the writer and is covered by U. S. patent 2,770,564 and assigned to the J. Hannan Co., Cleveland.

MACK GORDON

J. Hannan Co.
12727 *Buckeye Rd.*
Cleveland 20, *Ohio*

Yale air hoists have proved themselves ideal in every type of tough operation. They are especially safe for overhead handling in hazardous atmospheres. The air motor is explosion proof and cannot overheat. These light, compact hoists have constant speed control for smooth lift in either hook or trolley models. Capacities, ½ and 1 ton. Choice of roller or link chain, pendant or pull-cable control.

Contact your Yale distributor listed under "Hoists" in the Yellow Pages of your phone directory. Or write for brochure #5145A to The Yale & Towne Manufacturing Co., Yale Materials Handling Div., Dept. AH-5, Philadelphia 15, Pa.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists.

YALE®
INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS • HOISTS
YALE & TOWNE

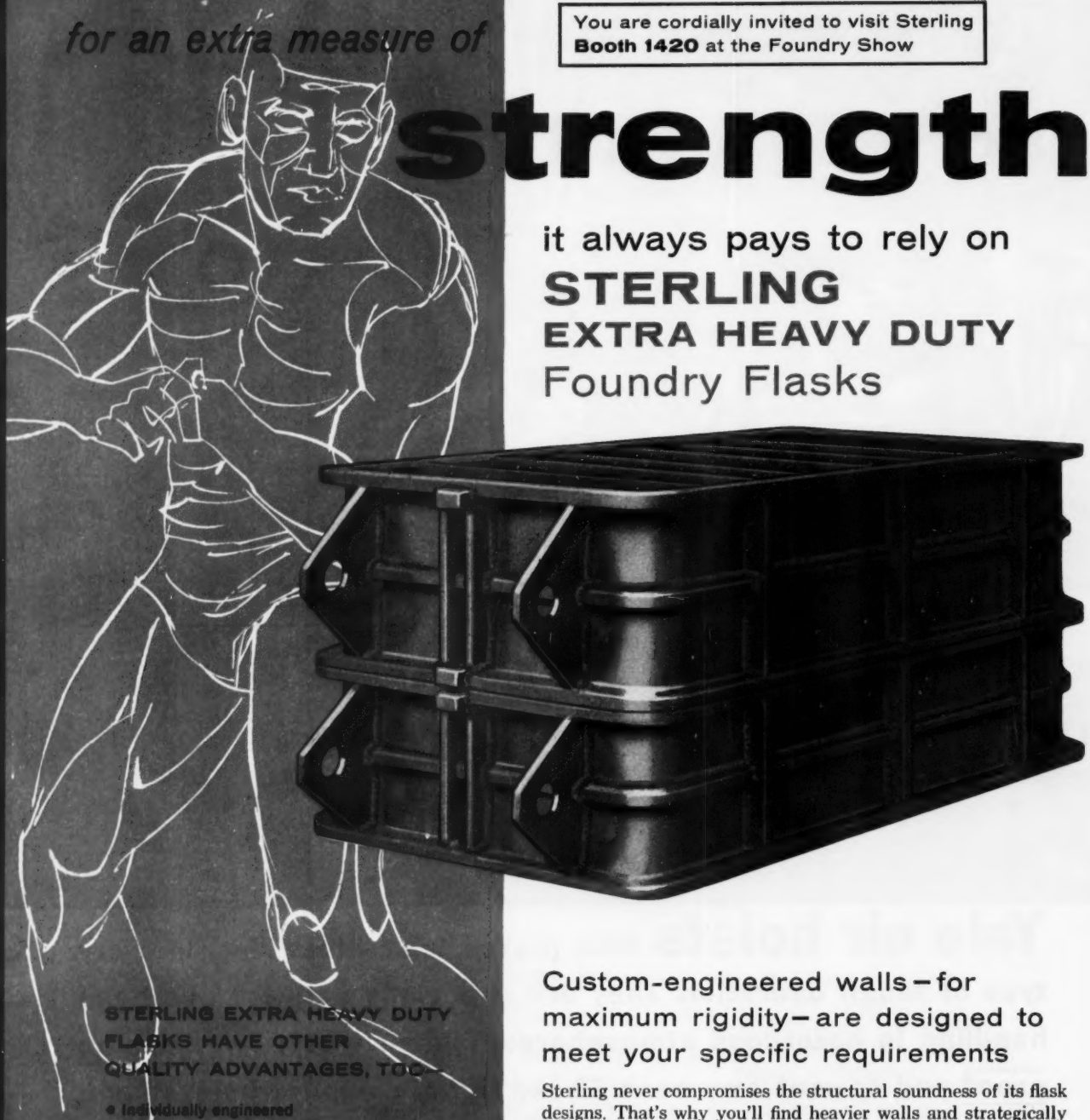
Circle 644 on Page 53

for an extra measure of

You are cordially invited to visit Sterling **Booth 1420** at the Foundry Show

strength

it always pays to rely on
STERLING
EXTRA HEAVY DUTY
Foundry Flasks



STERLING EXTRA HEAVY DUTY FLASKS HAVE OTHER QUALITY ADVANTAGES, TOO—

- Individually engineered
- Oversize flanges — extra thick, extra wide
- Flanges automatically precision-welded to walls
- Accurately machined surfaces
- Jig-welded fittings
- Available with floor-plate type walls if desired
- Stress relieved if desired

Custom-engineered walls—for maximum rigidity—are designed to meet your specific requirements

Sterling never compromises the structural soundness of its flask designs. That's why you'll find heavier walls and strategically positioned reinforcements . . . skillfully engineered for maximum strength and rigidity. As a result, Sterling heavy duty flasks can shrug off the brutal beating of today's high-production foundry equipment.

Regardless of your foundry requirements, you'll get an extra margin of reliability in Sterling extra heavy duty flasks. This kind of engineered strength is an important reason for Sterling's undisputed leadership in the foundry flask field.

AO-4542

Circle 645 on Page 53

STERLING NATIONAL INDUSTRIES, INC.
Founded in 1904 as Sterling Wheelbarrow Co.
Milwaukee 14, Wisconsin, U.S.A.
Associate: STERLING FOUNDRY SPECIALTIES LTD.
LONDON • BEDFORD • JARROW-on-TYNE, ENGLAND

Sterling
WORLD WIDE SERVICE

WHEREVER METALS ARE CAST FOUNDRY
MAY 1960

Age Creeping Up

The foundry industry will invest approximately $200 million in capital improvements in the near future. These rather ambitious buying plans are indicated by projecting a study recently completed by FOUNDRY and reported on Page 136 of this issue.

Improvement programs of this magnitude surely indicate that many foundrymen have confidence in the future potential of castings as engineering materials.

Nevertheless, this phase of foundry operation demands even greater attention. If foundries are to meet the ever growing competition, both from within and without the industry, more money must be allocated to modernization and mechanization of facilities and operations. This need is revealed in the results of FOUNDRY's 1960 inventory of foundry equipment, starting on Page 139. This inventory is our third since World War II, the first having been made in 1947 and the second in 1954.

The tremendous surge in equipment buying during and immediately after the war was reported in the 1947 inventory. Since that time machines have been allowed to grow older before replacement. This is well illustrated in the case of molding machines. In 1947, the study showed that 68 per cent of all molding machines had been in use less than 10 years and 32 per cent over 10 years. In 1954 the record was 63 per cent under 10 years and 37 per cent over 10 years.

The present study shows 41 per cent under 10 years and 59 per cent over 10 years. Since 1947, the number of machines in the under 5-year category has declined from 38 per cent to 11 per cent, and those in the 10 to 19 year group have increased from 26 per cent to 50 per cent. Age is creeping up on these machines.

Many questions arise when the reasons for this trend are considered. Have equipment manufacturers developed their lines sufficiently to obsolete completely many machines now in use? If such developments have been made, has sufficient sales pressures been exerted on foundries to emphasize the importance of replacement?

Have foundrymen operated on such a narrow profit margin that funds are not available for equipment purchases? Have depreciation laws delayed improvement in facilities? Have foundrymen failed to develop data on what old equipment is costing in high maintenance and production costs?

It would seem that now is the time to study this entire problem of equipment purchase.

Many will be doing so at the AFS Castings Congress and Exposition in Philadelphia, May 9-13.

Frank G. Steinebach

Editor

Foundries To Spend More for . . .

PLANT and EQUIPMENT

A large number of foundries plan extensive buying programs to improve their plant and equipment. Details of these buying plans and information on the amount and age of existing equipment, as presented on following pages, are based on a comprehensive study of the industry by FOUNDRY's research staff

● INDUSTRY and business will spend an estimated $36 billion this year for plant and equipment. Manufacturing alone is expected to account for $15 billion, and foundries will contribute substantially to this total.

FOUNDRY recently queried 5100 foundries in the United States and Canada about their plans for capital investment during the next two years. Replies were received from 1250 companies. From the standpoints of size of plant and types of castings produced, these companies provide an excellent cross section of the industry.

Foundries were asked to indicate which of approximately 55 different types of equipment they expect to order in 1960-61, also what plans they are making for plant expansion or new construction.

Data in the accompanying tables are a weighted projection for the entire industry of information supplied by foundries. The figures are based on actual buying intentions; in addition, some foundries said they need certain types of equipment, or would like to invest in new facilities, but are holding off buying for one reason or another. Note that the tables show the number of foundries and percentages of various size plants with buying intentions—not the number of equipment units expected to be bought.

What the Study Shows—Several general conclusions can be drawn from the accompanying data and from comments of foundries participating in this study:

1. Although it is generally recognized that casting capacity is adequate to meet today's demands, a sizable number of foundries are spending money for plant expansion.
2. Cleaning rooms and sand handling systems are the principal areas affected by major improvement programs.
3. A strong trend toward increased mechanical handling exists, particularly in the movement of sand and molds.
4. More foundries plan to buy molding machines than any other type of equipment.
5. Foundries are much more interested in buying shell coremaking machines than shell molding machines.

How They Rank—Here is how the ten most popular pieces of major equipment rank on foundries' shopping lists; the ranking is based on the number of foundries planning to buy the equipment:

Equipment	No. of Buyers
Molding machines	2272
Mullers and mixers	1498
Fork trucks	1286
Core blowers, shooters	1147
Dust arrestors	950
Shell core machines	903
Crucible furnaces	872
Air compressors	779
Front end loaders	732
Core and mold ovens	660

Foundries are in a considerably better buying mood today than they were in 1954 when a similar study was conducted. At that time, a period of poor business conditions, the number of foundries planning to buy the items of equipment listed above was 45 per cent smaller than today's group of prospective customers.

Mechanization—Nearly one-third of all foundries now have some form of mechanized sand handling systems. An additional 18 per cent plan to install such equipment. Practically all of the larger foundries—those with 250 or more employees—either have mechanized facilities or expect to acquire them.

Mechanized mold handling has been adopted less widely than mechanized sand handling, being found in only 15 per cent of all foundries. This situation is to be expected since the equipment is best adapted to the high-production shops. Nevertheless, 12 per cent of all foundries have plans for mechanizing their mold handling.

Core handling has been mechanized even less widely than mold handling—by only 6 per cent of all foundries. An additional 5 per cent expect to install this equipment, but in the case of both cores and molds this still leaves a considerable potential for adoption of mechanical handling facilities.

Trends in Equipment — Relative popularity of different types of foundry equipment is indicated by the number of prospective buyers listed in the accompanying table. Despite the high interest in shell core machines, core blowers and shooters still rank above them in buyer preference. Diecasting machines also stand high in buyers' favor, exceeding that for permanent mold equipment.

Outstanding in buying plans for furnaces and ovens is the interest shown in hot blast cupolas, electric induction furnaces, core and mold ovens, and heat treating furnaces.

Good demand for material handling equipment is reflected in the number of prospective buyers of fork lift trucks and front end loaders. Gas trucks continue to show a wide margin in preference over electric trucks—almost five to one.

Roller conveyors are the principal item foundries plan to buy among all types of conveyor units, followed by belt conveyors and monorails.

Dust control apparently will receive considerable attention from foundries during the next two years. A total of 950 plants indicate they expect to install dust arrestors, compared with only 400 foundries with such plans in 1954.

What It Will Cost — Foundries were asked to estimate their total investment in "new plants or *major* additions to your present facilities" during the next two years. About one-

Present and Proposed Foundry Mechanization

(Percentages of foundries having or planning to install indicated types of equipment)

	Mechanized Sand Handling		Mechanized Mold Handling		Mechanized Core Handling	
Size of Foundry	Now Have	Plan To Install	Now Have	Plan To Install	Now Have	Plan To Install
Over 1000 Employees	100%	..	80%	..	80%	..
500-999	88	9	63	12	42	9
250-499	86	12	46	10	30	5
100-249	57	18	28	16	16	12
50-99	30	29	15	24	8	9
20-49	32	17	10	10	4	3
Under 20	17	15	8	10	1	3
All Foundries	**32%**	**18%**	**15%**	**12%**	**6%**	**5%**
Type of Foundry						
Gray Iron	29	27	15	15	7	5
Malleable Iron	67	15	41	15	26	4
Steel	65	16	30	16	16	7
Nonferrous	30	13	13	11	4	4

fifth of the 1250 respondents indicated that their buying programs could be considered as "major" and supplied dollar values. The total cost given for these projects is approximately $52 million or an average of $212,000 per foundry.

The average spending per foundry varies from $42,000 for plants with fewer than 10 employees to nearly $1 million for foundries of more than 500 employees. These figures do not include the cost of proposed miscellaneous equipment purchases by many foundries which do not consider such buying to be major.

Strictly as a mathematical exercise —and taking the optimistic assumption that the proportion of foundries with major buying programs holds true also among those companies which did not participate in this study—it is possible to arrive at a total industry expenditure on major projects of about $200 million.

Regardless of whether the foregoing assumption is valid, it seems evident that foundries are vitally interested in improving plant efficiency and lowering production costs through plant modernization. This interest was best expressed by one foundryman when he commented, "Our modernization program will continue as long as we're in business. When we stop, we're dead."

● For an extra copy of this article, until supply is exhausted, use card on Page 53

Foundries Plan To Buy This Equipment During Next Two Years

Type of Equipment	Foundries With Buying Plans: Number of Foundries	Foundries With Buying Plans: Per Cent of All Foundries	Percentages of Various Sizes of Foundries Planning to Buy: Over 1000 Employees	500-999 Employees	250-499 Employees	100-249 Employees	50-99 Employees	20-49 Employees	Under 20 Employees
MOLDING, COREMAKING									
Molding Machines (Green Sand)	2,272	37%	79%	73%	62%	63%	54%	46%	22%
Molding Machines (Shell)	344	6	20	20	14	6	9	9	2
Core Blowers, Shooters	1,147	19	50	47	29	33	33	25	9
Shell Core Machines	903	15	58	53	33	27	22	15	8
Permanent Mold Machines	382	6	..	..	2	4	8	5	7
Diecasting Machines	512	8	6	3	5	6	11	7	9
Air Compressors	779	13	20	20	17	17	15	16	10
SAND PREPARATION									
Mullers and Mixers	1,498	25	60	53	36	30	28	30	19
Sand Conditioners	557	9	12	10	2	6	6	13	9
Magnetic Separators	325	5	20	20	19	15	8	4	2
Sand Reclamation Units	239	4	20	17	17	12	4	4	1
CLEANING, INSPECTION									
Vibrating Shakeouts	621	10	51	47	33	21	10	15	3
Airless Blast Machines	561	9	55	47	29	19	20	6	4
Pneumatic Blast Units	336	5	6	3	..	7	6	7	6
Tumbling Mills	175	3	12	10	2	2	3	3	3
Finishing Barrels	307	5	6	3	5	4	4	4	6
Swing Frame Grinders	231	4	4	13	7	5	5	9	1
Cut-off Grinders	310	5	5	10	5	2	10	5	4
Floor Stand Grinders	771	13	40	37	12	11	22	16	8
Portable Grinders	1,139	19	53	47	40	41	33	25	6
Metal Cutting Bandsaws	528	9	6	6	10	5	8	3	12
Welders, Flame Cutters	455	7	30	27	17	11	6	5	7
Chippers and Rammers	1,261	21	56	53	38	41	33	27	9
Radiographic Units	127	2	15	13	10	2	2	..	2
Physical Testers	361	6	10	6	10	11	10	8	3
FURNACE, OVEN									
Cupolas—Cold Blast	248	4	..	..	2	7	11	8	1
Cupolas—Hot Blast	171	3	15	13	12	10	5	1	1
Cupola Charging Units	288	5	6	3	5	12	15	4	1
Electric Arc Furnaces	170	3	20	17	7	3	1	2	3
Induction Furnaces	342	6	20	17	14	5	5	6	5
Crucible Furnaces	872	14	6	3	5	4	7	17	18
Noncrucible Furnaces	65	1	..	..	2	1	..	1	1
Reverberatory Furnaces	167	3	6	6	..	3	3	7	1
Core and Mold Ovens	660	11	30	30	5	10	12	18	8
Heat Treating Furnaces	473	8	30	23	31	17	15	9	2
MATERIAL HANDLING									
Fork Trucks—Gas	1,050	17	65	60	43	36	29	19	7
Fork Trucks—Electric	236	4	30	27	7	7	5	3	2
Front End Loaders (Under 1 cu yd)	474	8	20	17	14	19	14	15	1
Front End Loaders (1 cu yd or more)	258	4	10	6	5	12	12	4	1
Tow Trucks and Tractors	189	3	20	20	7	3	2	4	2
Motorized Wheelbarrows	68	1	6	3	5	4	4	..	..
Other Power Trucks	263	4	15	13	19	5	5	6	2
Bridge Cranes (Under 5 tons)	365	6	10	10	10	10	3	10	4
Bridge Cranes (5 tons or more)	219	4	30	27	14	9	7	4	..
Mobile Yard Cranes	87	1	12	10	7	6	2	..	..
Jib Cranes	261	4	30	27	19	6	8	4	1
Other Cranes	142	2	6	6	7	1	6	2	1
Electric Hoists	781	13	40	33	38	20	15	12	9
Air Hoists	615	10	40	40	24	23	12	15	3
Hand Hoists	248	4	6	6	7	3	4	4	4
Lifting Magnets	152	2	12	10	12	6	3	2	1
CONVEYING									
Monorail Conveyors	582	10	30	27	21	19	16	12	4
Roller Conveyors	1,047	17	45	43	40	30	25	18	10
Belt Conveyors (Hot)	339	6	25	20	17	10	9	6	2
Belt Conveyors (Cold)	523	9	40	37	36	20	12	12	1
Power Mold Conveyors	66	1	25	23	7	..	3	..	..
Vibrating Conveyors	296	5	30	30	24	9	8	6	1
Pneumatic Tube Conveyors	159	3	15	13	5	6	7	2	1
DUST CONTROL									
Dust Arrestors—Dry Bag	557	9	20	17	12	16	19	12	4
Dust Arrestors—Mechanical	176	3	6	3	7	1	7	2	2
Dust Arrestors—Wet	217	4	26	23	7	11	4	3	1

INVENTORY
of Foundry Equipment

This study of the amount and age of foundry equipment is based on confidential information supplied by 1250 representative U. S. and Canadian foundries. Figures were projected to give industry-wide totals

● AVERAGE AGE of principal types of foundry equipment has increased in recent years. Although there are some exceptions, the percentages of relatively new equipment of various types in operation are smaller than in 1954.

This trend is indicated from the results of FOUNDRY's recent study of the amount and age of the industry's production facilities. Similar surveys were made in 1954 and 1947. The following ten pages list quantity and age data for approximately 50 different types of equipment used today.

Active Items—Percentages of units in service which are less than five years old, when compared with percentages of older units, provide an indication of the types of equipment in relatively heaviest demand the last few years. On this basis, the following have been the most active items:

Shell mold and core machines, cupola chargers, electric induction furnaces, large capacity front-end loaders, barrel finishing machines, radiographic and physical testing equipment, and dust arrestors.

Equipment installed the last five years at close to the rate of the preceding five years includes heat treating furnaces, mechanical shakeouts, metal cutting band saws, and sand preparation and reclamation units.

In the case of most other equipment, the rate of new installations slowed down the last five years, although in numerous instances the number of new units acquired was larger than the number of old ones scrapped or otherwise disposed of. Net result of this trend has been to lengthen the average life of equipment in service.

More Productivity—There are a few outstanding examples in which the amount of equipment on hand has declined substantially because of the higher capacity of replacement units. For instance, in 1947 the industry had nearly 63,000 molding machines; in 1954 the total was about 50,000 and the latest count shows 43,000. Nevertheless, molding capacity today undoubtedly is equal to or greater than that of 13 years ago.

The number of cupolas also has been shrinking steadily—from 5235 in 1947 to 4460 in 1954 and 3200 today. This trend reflects the closing of a number of iron foundries—most of them small—but without a corresponding decrease in total iron casting capacity.

Electric furnaces show the largest percentage gains in installation of melting equipment since 1954. During that period the number of electric induction furnaces in use increased nearly 90 per cent, and the number of arc type units rose about 30 per cent.

Long Lived—Molding machines appear to be longer lived than core blowers. About 9 per cent of all molding machines—nearly 3900—are more than 20 years old, but only 4 per cent of the blowers have passed the two-score mark. A relatively large number of both types of equipment are approaching replacement since 50 per cent of the molding machines and 40 per cent of the core blowers are 10 to 20 years old.

Mechanical handling in the foundry industry requires a substantial amount of equipment. Among the major items are 7500 fork lift trucks, 3000 front end loaders, 16,000 bridge cranes, 1000 mobile yard cranes, 9000 jib cranes, 40,000 power hoists, and 15,000 hand hoists.

MOLDING . . .

● DATA on molding, coremaking, and sand preparation equipment reveal some divergent trends in number of units installed during recent years.

Only 11 per cent of the industry's green sand molding machines were acquired within the last five years, and the total number in service declined 7000 since the 1954 survey. On the other hand, 22 per cent of all core blowers and shooters are less than five years old, and the total number is up slightly since 1954. Moreover, 59 per cent of all molding machines are more than ten years old, compared with 44 per cent of the core blowers in that classification.

Shell Coremaking Spurts—Shell coremaking machines have topped shell mold units in demand after a slower start when the shell process was first being adopted. Nearly 1000 foundries now have about 1750 shell core machines, and 88 per cent, or 1500 units, were bought in the last five years. Approximately 550 foundries operate 930 shell mold machines, but only 66 per cent of the equipment is less than five years old. Smaller foundries operate most of the shell mold

	——SIZE OF FOUNDRY (Number of Employees)——							
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Molding Machines								
Number of Foundries	4,208	33	76	207	419	581	1,117	1,775
Number of Units	43,271	1,980	2,684	5,982	9,218	8,366	8,936	6,105
% 0-4 Years Old	11%	17%	18%	15%	11%	9%	10%	9%
% 5-9 Years Old	30	36	34	31	28	26	29	35
% 10-19 Years Old	50	32	36	41	52	60	53	45
% 20 or More Years	9	15	12	13	9	5	8	11
Shell Mold Machines								
Number of Foundries	553	12	29	61	62	75	127	187
Number of Units	936	65	67	128	155	113	191	217
% 0-4 Years Old	66%	70%	77%	65%	62%	40%	60%	82%
% 5 or More Years	34	30	23	35	38	60	40	18
Core Blowers, Shooters								
Number of Foundries	2,981	33	70	184	436	492	888	878
Number of Units	10,351	825	1,015	1,380	2,137	1,624	2,131	1,239
% 0-4 Years Old	22%	15%	18%	18%	23%	36%	20%	19%
% 5-9 Years Old	34	30	39	31	33	30	33	42
% 10-19 Years Old	40	50	37	45	39	30	44	36
% 20 or More Years	4	5	6	6	5	4	3	3
Shell Core Machines								
Number of Foundries	986	15	48	114	190	216	279	124
Number of Units	1,759	52	125	262	395	346	418	161
% 0-4 Years Old	88%	90%	95%	89%	96%	86%	80%	83%
% 5 or More Years	12	10	5	11	4	14	20	17
Diecasting Machines								
Number of Foundries	1,228	3	11	28	68	101	242	775
Number of Units	7,009	107	443	846	683	667	1,573	2,690
% 0-4 Years Old	34%	20%	21%	25%	50%	42%	30%	35%
% 5-9 Years Old	42	45	46	42	25	38	58	37
% 10-19 Years Old	21	29	26	28	25	12	10	26
% 20 or More Years	3	6	7	5	—	8	2	2

COREMAKING . . . SAND CONDITIONING

units; 57 per cent of the machines are in foundries with less than 50 employees. Plants of this size, however, have only 40 per cent of the coremaking equipment.

Muller Use Grows—Since 1954 the industry's total of sand mullers and mixers has increased several thousand units. Development of the small, portable type muller has helped to swell the total. Nearly 1000 machines—9 per cent of all types—are more than 20 years old. This percentage is relatively low, however, compared with the number of units in this age bracket which are operated by the largest foundries. Among shops with 500 or more employees, one-fourth of the mullers and mixers are pre-1940 vintage. In contrast, the percentage for foundries having less than 100 employees is well under 10 per cent.

Although the number of mobile and portable type sand conditioners has declined slightly since 1954, this type of equipment has increased in use among the smallest shops.

	——SIZE OF FOUNDRY (Number of Employees)——							
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Air Compressors								
Number of Foundries	5,263	33	76	188	542	708	1,206	2,510
Number of Units	10,908	198	338	677	1,518	1,699	2,532	3,946
% 0-4 Years Old	26%	12%	11%	19%	16%	23%	25%	36%
% 5-9 Years Old	31	24	27	20	21	32	36	35
% 10-19 Years Old	30	28	32	41	45	30	29	21
% 20 or More Years	13	36	30	20	18	15	10	8
Mullers & Mixers								
Number of Foundries	4,090	33	85	213	525	641	1,074	1,519
Number of Units	10,925	462	661	1,193	1,732	1,538	3,230	2,109
% 0-4 Years Old	23%	15%	16%	19%	20%	25%	26%	27%
% 5-9 Years Old	30	26	23	23	24	27	33	41
% 10-19 Years Old	38	31	39	46	46	40	35	28
% 20 or More Years	9	28	22	12	10	8	6	4
Sand Conditioners (Mobile or Portable)								
Number of Foundries	2,959	20	43	104	307	410	711	1,364
Number of Units	5,290	79	99	198	645	738	1,422	2,109
% 0-4 Years Old	19%	16%	22%	17%	19%	23%	21%	17%
% 5-9 Years Old	36	33	36	31	30	32	33	43
% 10-19 Years Old	39	31	26	43	43	35	38	38
% 20 or More Years	6	20	16	9	8	10	8	2
Magnetic Separators								
Number of Foundries	1,318	31	76	134	341	313	343	80
Number of Units	2,544	248	326	523	614	376	377	80
% 0-4 Years Old	30%	15%	16%	24%	24%	34%	66%	38%
% 5-9 Years Old	34	32	28	30	44	45	24	25
% 10-19 Years Old	28	35	41	37	29	19	7	—
% 20 or More Years	8	18	15	9	3	2	3	37
Sand Reclaimers								
Number of Foundries	360	20	31	75	112	97	25	—
Number of Units	492	36	47	120	157	107	25	—
% 0-4 Years Old	39%	10%	9%	29%	57%	15%	50%	—
% 5-9 Years Old	37	35	32	26	32	70	—	—
% 10-19 Years Old	18	35	45	35	7	15	50	—
% 20 or More Years	6	20	14	10	4	—	—	—

FURNACES...OVENS

● DECLINING TREND in number of gray iron foundries is reflected in current statistics on cupolas. Since six years ago, the number of cupolas in service has declined about 1100, and compared with the immediate postwar period the drop is nearly 2000 units.

Nearly 70 per cent of all cold-blast cupolas are ten or more years old. On the other hand, only 41 per cent of the hot-blast cupolas are in that age bracket, an indication of the growing popularity during the last ten years of the latter type of unit.

Installation of mechanical chargers also has moved counter to the trend in number of cupolas. Today, 51

	SIZE OF FOUNDRY (Number of Employees)							
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Cupolas (Cold Blast)								
Number of Foundries	2,129	21	45	97	277	423	561	705
Number of Units	3,030	124	137	217	489	584	690	789
% 0-4 Years Old	10%	5%	4%	15%	4%	10%	20%	4%
% 5-9 Years Old	21	30	32	16	31	13	24	15
% 10-19 Years Old	36	50	41	51	43	41	26	32
% 20 or More Years	33	15	23	18	22	36	30	49
Cupolas (Hot Blast)								
Number of Foundries	157	14	13	33	54	32	11	—
Number of Units	287	42	31	69	86	48	11	—
% 0-4 Years Old	27%	25%	24%	33%	33%	17%	15%	—
% 5-9 Years Old	32	30	29	24	33	33	85	—
% 10-19 Years Old	35	40	41	38	21	50	—	—
% 20 or More Years	6	5	6	5	13	—	—	—
Cupola Chargers								
Number of Foundries	1,111	23	45	109	230	255	292	157
Number of Units	1,414	92	109	153	276	306	321	157
% 0-4 Years Old	22%	2%	5%	16%	11%	26%	32%	40%
% 5-9 Years Old	32	31	26	13	36	18	48	48
% 10-19 Years Old	41	47	48	67	51	51	20	12
% 20 or More Years	5	20	21	4	2	5	—	—
Arc Furnaces								
Number of Foundries	547	15	40	75	145	92	100	80
Number of Units	1,373	59	126	256	343	264	196	129
% 0-4 Years Old	12%	9%	11%	6%	9%	10%	21%	35%
% 5-9 Years Old	23	15	13	24	24	27	31	40
% 10-19 Years Old	46	46	47	49	35	48	33	25
% 20 or More Years	19	30	29	21	32	15	15	—
Induction Furnaces								
Number of Foundries	382	5	17	40	62	63	82	113
Number of Units	1,510	74	142	275	204	271	282	262
% 0-4 Years Old	34%	11%	9%	22%	45%	38%	37%	53%
% 5-9 Years Old	29	56	32	17	40	34	30	20
% 10-19 Years Old	36	31	54	61	15	26	33	27
% 20 or More Years	1	2	5	—	—	2	—	—

per cent of all cupola operators do their charging mechanically, against slightly less than 30 per cent in 1954.

Electric Furnaces—In contrast to the decrease in cupola population, electric melting units have grown steadily in number. The increase for arc type furnaces since 1954 has been nearly 30 per cent, and induction furnace use has shown even a larger growth—more than 80 per cent. A sizable part of the induction furnace increase has occurred among smaller foundries.

Measured only by numbers, crucible furnaces continue as the most popular melting medium. Foundries have some 14,700 of them—about 1000 more than were on hand six years ago—and nearly 60 per cent of them are less than ten years old.

Ovens—Number of core and mold ovens has declined moderately in recent years. This situation is attributable to both the development of new types of core binders and to the greater capacity of modern continuous core ovens. Today's 11,200 core and mold ovens compare with 13,000 in 1954 and 14,000 in 1947.

Heat Treating—Growth in heat treatment of castings and the steady upturn in production of aluminum castings is indicated by the increasing number of heat treating units in service. The current total of 5857 furnaces is 15 per cent larger than in 1954 and 45 per cent ahead of the 1947 figure. There has also been an increase of nearly 45 per cent since 13 years ago in the number of foundries performing heat treating operations.

Acquisition of heat treating equipment has been particularly marked among the smallest foundries during the last ten years. About 80 per cent of the units operated by such shops were installed during that period, compared with less than 50 per cent for the largest foundries. Nearly 15 per cent of all furnaces are more than 20 years old.

		SIZE OF FOUNDRY (Number of Employees)						
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Crucible Furnaces								
Number of Foundries	3,483	7	15	55	181	305	655	2,265
Number of Units	14,697	149	273	905	1,535	2,029	3,440	6,366
% 0-4 Years Old	23%	12%	13%	16%	15%	13%	29%	26%
% 5-9 Years Old	36	41	44	40	48	38	28	35
% 10-19 Years Old	33	45	39	38	32	37	27	35
% 20 or More Years	8	2	4	6	5	12	16	4
Noncrucible Furnaces								
Number of Foundries	297	2	4	13	28	48	70	132
Number of Units	898	4	14	53	177	196	187	267
% 0-4 Years Old	9%	50%	17%	33%	10%	8%	4%	8%
% 5-9 Years Old	23	50	9	13	40	28	10	20
% 10-19 Years Old	38	—	35	21	8	24	48	62
% 20 or More Years	30	—	39	33	42	40	38	10
Reverberatory Furnaces								
Number of Foundries	381	3	9	27	44	50	92	156
Number of Units	1,034	28	72	211	161	138	200	224
% 0-4 Years Old	36%	7%	5%	19%	41%	43%	60%	40%
% 5-9 Years Old	20	40	32	17	44	30	37	20
% 10-19 Years Old	31	38	43	52	12	5	3	15
% 20 or More Years	13	15	20	12	3	22	—	25
Core & Mold Ovens								
Number of Foundries	4,405	33	84	202	503	656	1,053	1,874
Number of Units	11,213	825	790	1,414	1,911	1,574	2,001	2,698
% 0-4 Years Old	9%	10%	9%	7%	7%	8%	6%	14%
% 5-9 Years Old	29	21	18	16	40	28	26	36
% 10-19 Years Old	44	29	40	53	43	51	53	36
% 20 or More Years	18	40	33	24	10	13	15	14
Heat Treating and Annealing Furnaces								
Number of Foundries	1,783	33	74	177	363	365	330	441
Number of Units	5,857	429	858	1,186	1,234	876	561	713
% 0-4 Years Old	21%	16%	14%	13%	16%	20%	21%	61%
% 5-9 Years Old	26	31	30	22	24	29	34	20
% 10-19 Years Old	39	36	41	47	39	38	42	17
% 20 or More Years	14	17	15	18	21	13	3	2

CLEANING...INSPECTION

● CLEANING ROOM equipment in American foundries was being modernized at a fast rate when FOUNDRY made its 1954 census of foundry equipment. Today, that trend seems to have slowed down in some types.

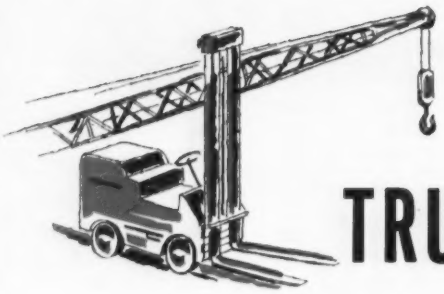
In many categories, less than 20 per cent of the units currently in use are under five years old. In this group are tumbling mills, 5 per cent; floor stand grinders, 16 per cent; airless blast units, 17 per cent; and swing frame grinders, 19 per cent.

In contrast, 41 per cent of chippers and rammers, 39 per cent of portable grinders, 37 per cent of barrel finishers, and 36 per cent of cutoff machines were purchased less than five years ago.

Undoubtedly as a reflection of the modern demand for quality castings, 47 per cent of the 450 radiographic units in use were purchased during the last five years. This trend is particularly apparent in smaller plants, where 60 per cent of such units in the 20-49 employee group and 86 per cent in foundries with under 20 employees are under five years old.

	SIZE OF FOUNDRY (Number of Employees)							
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Vibrating Shakeouts								
Number of Foundries	1,745	33	84	188	402	328	419	291
Number of Units	3,718	364	506	752	809	492	461	334
% 0-4 Years Old	29%	20%	21%	25%	29%	36%	38%	41%
% 5-9 Years Old	33	31	30	25	27	42	43	47
% 10-19 Years Old	33	39	38	44	40	20	17	12
% 20 or More Years	5	10	11	6	4	2	2	—
Airless Blast Units								
Number of Foundries	2,236	28	69	172	409	417	698	443
Number of Units	3,852	203	311	602	820	667	768	481
% 0-4 Years Old	17%	15%	16%	17%	18%	20%	18%	15%
% 5-9 Years Old	34	28	24	23	39	47	35	32
% 10-19 Years Old	45	47	49	54	41	32	45	51
% 20 or More Years	4	10	11	6	2	1	2	2
Pneumatic Blast Units								
Number of Foundries	1,843	20	49	129	296	261	406	682
Number of Units	2,496	84	123	245	414	365	447	818
% 0-4 Years Old	24%	25%	24%	10%	16%	8%	27%	38%
% 5-9 Years Old	26	16	15	14	26	31	42	21
% 10-19 Years Old	36	34	31	53	43	51	12	34
% 20 or More Years	14	25	30	23	15	10	19	7
Tumbling Mills								
Number of Foundries	1,774	16	53	98	274	261	368	704
Number of Units	3,713	106	318	392	767	679	552	899
% 0-4 Years Old	5%	3%	5%	4%	5%	4%	5%	6%
% 5-9 Years Old	16	13	23	11	10	13	14	24
% 10-19 Years Old	57	55	52	57	61	60	63	51
% 20 or More Years	22	29	20	28	24	23	18	19
Barrel Finishers								
Number of Foundries	1,118	5	9	33	84	156	178	653
Number of Units	2,015	26	43	79	202	376	374	915
% 0-4 Years Old	37%	35%	48%	24%	25%	15%	33%	52%
% 5-9 Years Old	30	25	31	33	31	23	50	25
% 10-19 Years Old	32	34	16	36	34	62	17	23
% 20 or More Years	1	6	5	7	10	—	—	—

TYPE OF EQUIPMENT	Total	SIZE OF FOUNDRY (Number of Employees) Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Swing Frame Grinders					268	223	254	220
Number of Foundries	1,189	28	60	136				
Number of Units	2,835	274	282	544	697	396	356	286
% 0-4 Years Old	19%	8%	7%	13%	18%	29%	35%	26%
% 5-9 Years Old	32	22	24	28	35	34	35	45
% 10-19 Years Old	42	48	48	49	45	34	26	29
% 20 or More Years	7	22	21	10	2	3	4	—
Cut-Off Machines								
Number of Foundries	1,822	18	45	102	224	283	457	693
Number of Units	2,395	55	93	255	314	368	548	762
% 0-4 Years Old	36%	30%	27%	29%	34%	36%	38%	40%
% 5-9 Years Old	43	40	32	37	44	43	44	45
% 10-19 Years Old	20	25	34	28	22	20	18	15
% 20 or More Years	1	5	7	6	—	1	—	—
Floor Stand Grinders								
Number of Foundries	4,759	32	80	211	498	633	1,147	2,158
Number of Units	15,708	864	883	1,604	2,539	2,405	3,326	4,087
% 0-4 Years Old	16%	27%	14%	13%	19%	18%	19%	17%
% 5-9 Years Old	21	30	18	17	23	21	23	20
% 10-19 Years Old	52	29	57	55	48	50	49	52
% 20 or More Years	11	14	11	15	10	11	9	11
Portable Grinders								
Number of Foundries	3,936	27	76	196	423	585	943	1,686
Number of Units	23,641	3,240	2,660	4,116	4,272	3,510	2,640	3,203
% 0-4 Years Old	39%	40%	35%	37%	38%	41%	42%	40%
% 5-9 Years Old	48	46	41	43	51	53	54	51
% 10-19 Years Old	13	14	24	20	11	6	4	9
Metal Cutting Saws								
Number of Foundries	3,615	25	68	179	347	406	786	1,804
Number of Units	5,349	103	163	376	555	609	1,179	2,364
% 0-4 Years Old	28%	29%	26%	28%	30%	28%	26%	29%
% 5-9 Years Old	30	35	31	32	33	30	29	30
% 10-19 Years Old	35	25	38	34	33	39	37	32
% 20 or More Years	7	11	5	6	4	3	8	9
Welders, Flame Cutters								
Number of Foundries	3,029	31	75	197	402	551	732	1,041
Number of Units	12,495	1,243	1,123	1,986	1,849	1,843	1,558	2,893
% 0-4 Years Old	32%	29%	33%	29%	31%	32%	36%	35%
% 5-9 Years Old	48	50	49	46	47	45	48	51
% 10-19 Years Old	19	18	17	23	22	22	16	14
% 20 or More Years	1	3	1	2	—	1	—	—
Chippers, Rammers								
Number of Foundries	3,707	33	80	207	439	601	1,017	1,330
Number of Units	53,028	4,283	5,106	8,822	9,975	8,515	9,670	6,657
% 0-4 Years Old	41%	43%	41%	38%	40%	41%	42%	41%
% 5-9 Years Old	46	48	47	46	46	44	48	43
% 10-19 Years Old	12	7	11	15	13	13	9	16
% 20 or More Years	1	2	1	1	1	2	1	—
Radiographic Units								
Number of Foundries	451	25	31	98	83	92	68	54
Number of Units	572	47	75	118	98	99	75	60
% 0-4 Years Old	47%	35%	37%	32%	57%	33%	60%	86%
% 5-9 Years Old	28	32	29	26	21	50	20	14
% 10-19 Years Old	25	33	34	42	22	17	20	—
Physical Testing Units								
Number of Foundries	1,688	30	78	217	442	358	309	254
Number of Units	3,022	196	235	446	886	537	463	259
% 0-4 Years Old	31%	35%	32%	29%	28%	30%	33%	35%
% 5-9 Years Old	35	37	35	34	33	35	37	36
% 10-19 Years Old	29	21	25	30	34	31	27	29
% 20 or More Years	5	7	8	7	5	4	3	—



TRUCKS..CRANES..HOISTS

● GROWTH in mechanical handling in foundries has been particularly marked in recent years. For instance, the number of power hoists in use rose from 19,000 in 1947 to 29,000 in 1954 and to 40,500 today. Foundries now have more than twice as many cranes as they did 13 years ago. During the same period the foundry fleet of fork lift trucks has increased 50 per cent. The accompanying figures indicate that 20 years generally is the maximum life of fork trucks; few units are listed in the over-20-year category. Although electric hoists are used by twice as many foundries as employ air hoists, the number of the latter per plant is higher.

		——SIZE OF FOUNDRY (Number of Employees)——						
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Gas Fork Trucks								
Number of Foundries	2,151	30	77	188	442	477	482	455
Number of Units	5,696	420	654	1,203	1,370	763	675	611
% 0-4 Years Old	35%	28%	30%	32%	35%	42%	38%	42%
% 5-9 Years Old	43	54	36	41	43	40	41	39
% 10-19 Years Old	20	16	31	26	21	18	19	19
% 20 or More Years	2	2	3	1	1	—	2	—
Electric Fork Trucks								
Number of Foundries	696	19	44	93	207	123	140	70
Number of Units	1,970	285	238	391	598	234	154	70
% 0-4 Years Old	28%	10%	11%	28%	25%	45%	67%	71%
% 5-9 Years Old	38	53	43	36	38	27	15	23
% 10-19 Years Old	33	37	46	35	35	28	18	6
% 20 or More Years	1	—	—	1	2	—	—	—
Front-End Loaders (Under 1 yd.)								
Number of Foundries	1,103	25	48	127	235	253	317	98
Number of Units	2,020	74	91	292	540	481	444	98
% 0-4 Years Old	47%	20%	23%	44%	41%	58%	49%	67%
% 5-9 Years Old	35	70	42	30	43	33	38	33
% 10-19 Years Old	18	10	35	26	16	9	13	—
% 20 or More Years	—	—	—	—	—	—	—	—
Front-End Loaders (1 yd. & over)								
Number of Foundries	543	16	35	43	168	134	127	20
Number of Units	980	64	63	56	370	255	152	20
% 0-4 Years Old	54%	43%	55%	62%	44%	58%	75%	50%
% 5-9 Years Old	28	33	21	22	41	27	18	50
% 10-19 Years Old	18	24	24	16	15	15	7	—
Tow Trucks								
Number of Foundries	564	28	53	75	101	119	86	102
Number of Units	1,127	197	186	165	182	190	103	104
% 0-4 Years Old	25%	10%	9%	19%	40%	20%	38%	56%
% 5-9 Years Old	39	32	48	28	27	50	34	34
% 10-19 Years Old	31	47	35	44	28	30	28	10
% 20 or More Years	5	11	8	9	5	—	—	—
Other Power Trucks								
Number of Foundries	759	29	45	116	190	112	178	89
Number of Units	2,542	203	311	603	646	280	374	125
% 0-4 Years Old	29%	15%	18%	26%	26%	43%	40%	54%
% 5-9 Years Old	29	43	33	35	29	21	19	22
% 10-19 Years Old	40	41	47	39	41	33	41	24
% 20 or More Years	2	1	2	—	4	3	—	—

TYPE OF EQUIPMENT	Total	SIZE OF FOUNDRY (Number of Employees) Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Bridge Cranes (Under 5 tons)								
Number of Foundries	2,444	26	53	141	380	365	749	730
Number of Units	9,932	754	668	1,142	2,584	1,387	2,172	1,225
% 0-4 Years Old	14%	5%	7%	10%	15%	16%	17%	15%
% 5-9 Years Old	29	14	16	29	34	33	31	32
% 10-19 Years Old	44	44	43	47	41	43	47	49
% 20 or More Years	13	37	34	14	10	8	5	4
Bridge Cranes (5 tons & over)								
Number of Foundries	1,434	31	74	184	347	273	292	233
Number of Units	6,137	720	844	1,343	1,527	819	613	271
% 0-4 Years Old	11%	8%	11%	7%	12%	14%	17%	17%
% 5-9 Years Old	16	15	13	13	16	17	21	22
% 10-19 Years Old	32	28	24	35	35	29	20	23
% 20 or More Years	41	49	52	45	37	40	42	38
Mobile Yard Cranes								
Number of Foundries	733	27	45	102	212	142	112	93
Number of Units	995	108	77	133	276	170	126	105
% 0-4 Years Old	18%	13%	14%	16%	17%	27%	20%	21%
% 5-9 Years Old	31	47	45	29	21	33	30	32
% 10-19 Years Old	38	29	31	46	49	30	30	25
% 20 or More Years	13	11	10	9	13	10	20	22
Jib Cranes								
Number of Foundries	1,537	31	75	170	342	226	350	343
Number of Units	8,824	1,488	1,425	1,689	1,710	1,055	870	587
% 0-4 Years Old	19%	16%	22%	18%	26%	20%	20%	19%
% 5-9 Years Old	31	25	28	27	43	51	34	30
% 10-19 Years Old	39	41	34	38	23	29	40	48
% 20 or More Years	11	18	16	17	8	—	6	3
Air Hoists								
Number of Foundries	1,822	31	65	179	347	372	444	384
Number of Units	19,007	4,340	3,034	3,580	3 539	2,232	1,376	906
% 0-4 Years Old	24%	22%	23%	23%	25%	25%	26%	24%
% 5-9 Years Old	38	34	38	26	40	38	50	50
% 10-19 Years Old	33	34	35	46	32	35	18	22
% 20 or More Years	5	10	4	5	3	2	6	4
Electric Hoists								
Number of Foundries	3,747	30	65	181	414	596	863	1,598
Number of Units	21,508	3,613	2,015	3,120	3,933	3,576	2,675	2,576
% 0-4 Years Old	21%	10%	8%	16%	23%	25%	32%	30%
% 5-9 Years Old	37	32	36	22	37	46	45	37
% 10-19 Years Old	39	52	53	57	37	27	22	31
% 20 or More Years	3	6	3	5	3	2	1	2
Hand Hoists								
Number of Foundries	3,262	30	59	176	336	432	733	1,496
Number of Units	14,472	1,765	1,023	1,789	1,878	2,264	2,467	3,286
% 0-4 Years Old	24%	26%	23%	20%	23%	24%	27%	24%
% 5-9 Years Old	25	28	22	33	15	16	25	20
% 10-19 Years Old	45	36	50	41	59	58	43	52
% 20 or More Years	6	10	5	6	3	2	5	4
Lifting Magnets								
Number of Foundries	919	30	77	183	336	159	103	31
Number of Units	1,834	210	316	448	503	209	117	31
% 0-4 Years Old	15%	9%	10%	10%	19%	35%	5%	40%
% 5-9 Years Old	31	33	34	30	37	15	33	10
% 10-19 Years Old	43	48	43	53	39	42	17	35
% 20 or More Years	11	10	13	7	5	8	45	15

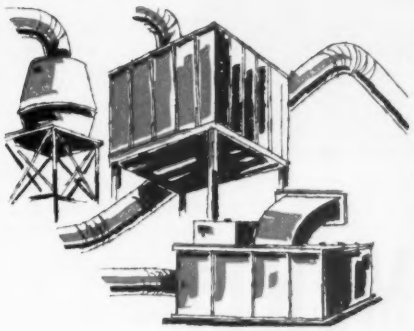
CONVEYORS

● AS MIGHT BE expected in an industry which handles many tons of materials for each ton of the final product it makes, the foundry industry uses a lot of conveyors—a total of nearly 3¾ million ft of the various types tabulated here.

Far and away the most common types are overhead monorail and roller conveyors, each of which is used in more than 2000 foundries. The only kind of conveyor which is not used by foundries of all sizes is the pneumatic tube type, which as yet has not found applications in the very smallest foundries.

Logically enough, the greatest use of conveyors is in larger foundries, where more materials are moved longer distances. Thus about 30 foundries with more than 1000 employees use nearly three times as much footage as the hundreds of plants with fewer than 20 employees. This disparity undoubtedly is related to needs, but the smaller foundries are well represented in only two categories, overhead monorail and roller, and these two are widely used everywhere.

		SIZE OF FOUNDRY (Number of Employees)						
TYPE OF CONVEYOR	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Overhead Monorail								
Number of Foundries	2,264	33	59	152	307	447	634	632
Footage	1,342,160	148,500	153,400	228,000	274,020	223,500	200,980	113,760
Gravity Roller								
Number of Foundries	2,202	33	74	186	397	372	584	556
Footage	994,040	98,790	105,820	187,860	198,710	145,080	175,200	82,580
Belt—Hot Materials								
Number of Foundries	685	20	49	120	207	119	127	43
Footage	189,650	36,420	39,200	47,520	37,260	14,880	10,410	3,960
Belt—Cold Materials								
Number of Foundries	1,379	33	76	188	335	230	381	136
Footage	777,670	178,200	124,180	203,040	162,480	47,610	47,880	14,280
Power Car Mold								
Number of Foundries	288	25	48	57	89	14	24	31
Footage	214,940	63,750	57,020	44,740	44,770	1,120	1,680	1,860
Vibrating & Oscillating								
Number of Foundries	596	28	62	129	168	82	76	51
Footage	55,910	10,080	9,610	15,480	12,430	4,100	3,190	1,020
Pneumatic Tube								
Number of Foundries	174	28	30	46	33	37	—	—
Footage	133,770	56,110	20,400	32,200	10,260	14,800	—	—



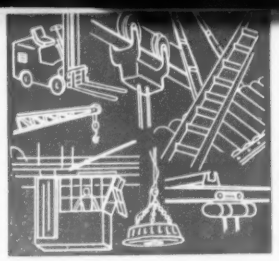
DUST ARRESTORS

● FOUNDRIES use a total of more than 11,000 dry, mechanical, and wet-type dust arrestors. Of this number, more than one-third are under five years old.

An oddity shows up in figures on this type of equipment in that the smaller foundries have more modern equipment than the larger ones. The answer probably is that such units are relative newcomers to smaller plants, not that the larger companies are lagging. In any event, just about half the units in foundries with fewer than 20 employees are under five years old. In those foundries with more than 1000 employees, under a quarter of the arrestors are less than five years old.

Dry-type arrestors are the most common ones in foundry applications: More than one-half of all arrestors in foundries are of this kind. The mechanical types run second, and they apparently will continue to gain in popularity since a greater percentage of them is under five years old than in either of the other two kinds—40 per cent versus 32 per cent dry and 29 per cent wet.

	——SIZE OF FOUNDRY (Number of Employees)——							
TYPE OF EQUIPMENT	Total	Over 1000	500 to 999	250 to 499	100 to 249	50 to 99	20 to 49	Under 20
Dry Bag Type								
Number of Foundries	2,974	30	65	184	453	507	952	783
Number of Units	5,909	237	390	681	1,132	1,014	1,332	1,123
% 0-4 Years Old	32%	25%	24%	28%	27%	26%	38%	42%
% 5 or More Years	68%	75%	76%	72%	73%	74%	62%	58%
Units under 3,000 cfm	26%	6%	7%	11%	13%	22%	30%	55%
Units 3,000-9,000 cfm	40%	33%	35%	34%	45%	45%	44%	32%
Units 10,000-25,000 cfm	28%	36%	51%	39%	34%	29%	25%	10%
Units over 25,000 cfm	6%	25%	7%	16%	8%	4%	1%	3%
Mechanical Type								
Number of Foundries	1,395	27	46	134	157	209	292	530
Number of Units	2,795	189	146	509	345	502	467	637
% 0-4 Years Old	40%	20%	19%	28%	42%	39%	46%	57%
% 5 or More Years	60%	80%	81%	72%	58%	61%	54%	43%
Units under 3,000 cfm	34%	19%	21%	14%	36%	25%	55%	48%
Units 3,000-9,000 cfm	35%	26%	28%	36%	37%	46%	28%	31%
Units 10,000-25,000 cfm	26%	36%	34%	34%	25%	29%	17%	21%
Units over 25,000 cfm	5%	19%	17%	16%	2%	—	—	—
Wet Type								
Number of Foundries	722	28	63	148	201	149	102	31
Number of Units	2,314	364	504	607	482	224	102	31
% 0-4 Years Old	29%	20%	21%	24%	43%	27%	62%	50%
% 5 or More Years	71%	80%	79%	76%	57%	73%	38%	50%
Units under 3,000 cfm	5%	6%	5%	3%	2%	13%	10%	40%
Units 3,000-9,000 cfm	19%	5%	5%	20%	30%	35%	42%	60%
Units 10,000-25,000 cfm	46%	47%	52%	43%	52%	39%	38%	—
Units over 25,000 cfm	30%	42%	38%	34%	16%	13%	10%	—



When Should Foundries

BUY NEW EQUIPMENT?

There's no simple answer to this question. Factors to be considered in approaching the problem are discussed here in recommendations offered by manufacturers of various types of foundry equipment

● THE QUESTION of when to purchase equipment faces foundry management continuously. In this period of growing competition for castings orders, higher demands for quality of product, and rising costs of manpower, determining the time and extent of replacing or adding equipment is vitally important to the operator who expects to grow and prosper.

When should foundrymen purchase equipment?

Two years ago we asked that question of a number of successful foundrymen, and the replies were presented in a special report, "Are You Paying for Equipment You Don't Have?" (FOUNDRY, May 1958, page 136).

Recently we asked a cross section of manufacturers of foundry equipment to comment on this question. Their replies suggest a wide range of factors which should be given careful consideration by foundrymen in determining when to buy equipment.

Keeping Competitive—The most frequently mentioned reason for equipment purchases is the need to meet competition of other foundries or other processes by improved product quality and reduced production costs. Frequently this goal can be achieved by replacing worn-out or obsolete machines. New equipment also may improve working conditions, provide greater safety, and develop other benefits.

Equipment manufacturers believe that foundrymen should have more accurate data on the cost of operating their present equipment. They recommend the latest MAPI formula revision as a practical method for handling capital investment problems, but suggest the need for some modification to meet special foundry conditions. They also stress the importance of foundrymen being familiar with the latest designs in equipment, and they accept the responsibility for keeping their customers informed.

When should foundrymen purchase equipment?

Equipment manufacturers feel that too often foundries have been slow in making needed expenditures for capital equipment. As a result, many foundries are operating with worn, obsolete, or inefficiently arranged equipment.

For these, foundry equipment manufacturers believe that the time for foundrymen to buy equipment is *now*! Their more detailed recommendations on this subject follow.

"A Continuing Process"

TECHNICAL PROGRESS now is so rapid that modernization of facilities is a continuing process. Modern machines do not wear out. They usually are discarded because new ideas and designs reduce their operating value so that they are three and four times as expensive to operate as a redesigned new machine for the same job.

This point cannot be overemphasized, for foundrymen must remain competitive or lock their doors. They must have new, low-operating-cost equipment or lose out to their more alert competitors. To stand still with present equipment is to slide backward.

One major function of foundry management is to discover whatever better equipment is available to perform a productive function and then to determine when it should be installed in the best interest of the business. This must be done by a careful analysis of both present equipment and the newly designed equipment.

We believe that the latest MAPI formula revision is the most practical method for coping with capital equipment replacement problems. We have found it necessary, however, to incorporate our specialized knowledge of blast cleaning equipment into the basic MAPI framework to help foundrymen understand fully the unique operating cost problems of that equipment.

No capital equipment replacement study can be any better than the facts and the theory on which it is built. No formula can be a surefire solution to individual foundry equipment replacement problems. The equipment replacement analyses prepared by our field engineers (and any other such studies) never can be more than a management tool. They never will replace sound business judgment or management experience, but can complement

them and help the executive determine a course of action with as many facts at his disposal as possible.

If management does not have good operating data and cost information on present equipment, its equipment studies will be only guesswork, no matter how solid the theory behind the method of analysis. Likewise, the best operating data are useless if applied to an unrealistic equipment replacement formula or rule of thumb.

We believe that any machine should be retired as soon as it can be replaced by equipment which reduces costs, does a better job, has higher production capacity, or provides any combination of these factors beneficial to the over-all operation of a particular foundry. It is the responsibility of management, with the assistance of foundry equipment manufacturers, to analyze their production tools periodically and replace all machinery and equipment which is obsolete in design or performance.

"Where Savings Can Be Made"

SOME FOUNDRYMEN purchase equipment, such as dust collectors, when a need is known. Others wait until forced into action by an air pollution regulation, a health hazard, or by the growth in population around the plant.

Purchasing when a need develops certainly is more practical. For example, if a new sand handling system is being purchased, including shakeouts and sand reclaimers, savings can be realized by having the supplier of dust collection equipment work with those producing the handling system. Savings can be realized in installation cost and in maintenance.

When provision is not made for the necessary collection and ventilation equipment at the time the sand system is purchased, it becomes necessary to make many engineering compromises in equipment location and ductwork required to get dust from the producing point to the collector.

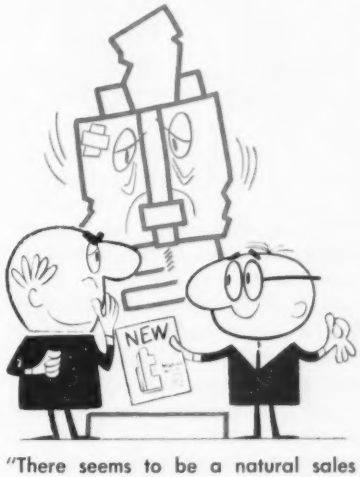
Having the hooding and ductwork developed by the suppliers of the equipment and collectors will be more practical and less costly than having it done by a local sheet-metal contractor after the equipment has been installed and is in operation. An important factor to be considered in the purchase of dust collection equipment is the provision of properly sized hoods which exhaust enough air to give workers a clean work environment.

New equipment for collecting dust should be purchased when new dust producing equipment is being planned or when older collecting equipment is worn out. Dust collection equipment is in a constant state of flux as new inventions and new uses for old inventions appear. These new developments make it attractive, in many instances, to change equipment, thus improving operating conditions and reducing maintenance requirements.

"Competition Dictates Action"

ACTION to purchase foundry equipment may come from forces set in motion either within or without the foundryman's organization. If the need is for added capacity, the motivating force usually is created by the foundryman. If worn-out equipment is to be replaced, the pressure may come from within or without. Often it is a combination of efforts of the equipment representative and foundry operating personnel.

When equipment still is serviceable and the capacity sufficient, obsolescence may cause its replacement. This pressure may come from within, if competition requires better, more efficient methods, or simply because foundry management seeks more profitable operation.



"There seems to be a natural sales resistance toward making a change"

Outside of unusual conditions, such as a national emergency, the most compelling force causing foundrymen to purchase foundry equipment generally is competition —not only from other foundries, but also from other methods of fabrication. Price, quality, and service are involved.

Another important point concerns the market potential for equipment makers. Volume of equipment sales based on replacement of worn-out machines or increases in productive capacity of foundries is in itself not sufficient for the production machinery manufacturer to maintain a profitable level of equipment sales.

Obviously, as a result, the equipment manufacturer must strive continually to produce new and better equipment capable of obsoleting existing machines and methods. It also is necessary for the equipment manufacturer to keep the foundryman well informed at all times of the products he has developed that will do the job better.

"Obsolescence Vital Factor"

EQUIPMENT we supply foundries consists primarily of conveyors which handle sand, cores, or castings to, from, and between foundry processing machinery. Often, a foundryman's decision to purchase such units is not based on whether or not he wants to buy a new conveyor. If he decides to buy improved sand preparation or casting cleaning equipment, he finds it imperative to invest in conveyors to handle the sand or the castings.

Although material handling equipment is accepted as a necessity in the modern foundry, it is, nevertheless, the tail that tags along with the installation of improved or additional molding, pouring, or cleaning equipment.

Competitive conditions have a great deal to do with the decision to replace old equipment or add additional units. In the competitive year of 1958, foundries which had not modernized were forced to close and concede to companies whose forward planning had provided them more modern, high-production facilities with lower unit operating costs.

More equipment should be replaced because of obsolescence than as a result of deterioration. Instead of wondering how much longer a machine will last, the foundryman should ask, "Can I afford to operate the old equipment with its lower production rates and higher operating costs, or should I invest in a modern installation with higher production rates and lower operating costs?"

A decision to purchase therefore should be based on sound analysis of unit operating costs, including cost of capital investment of old and new equipment. Foundrymen should analyze equipment needs now on the basis of competition expected in two, three, and four years, rather than on the basis of last year's operation or what they expect in 1960. Those who stand by their present equipment and facilities are sure to lose ground to the competition.

"Change Brings Resistance"

PROFIT MOTIVATION is the factor which determines under what conditions foundrymen should purchase equipment. This goal is stimulated by resultant needs, such as need for additional equipment to satisfy expansion of capacity requirements; need for new, better, and primarily more efficient apparatus to correct high-cost operations; need for labor-saving equipment to meet a labor problem; or need for new or modified equipment to meet technological changes and requirements.

There seems to be, at least from a seller of capital goods viewpoint, a natural reluctance or sales resistance to change, despite advantages offered capacitywise, efficiencywise, profitwise, etc., in making capital expenditures.

A few, but in our experience a distinct minority of capital goods buyers, make their decisions when to buy on the basis of the MAPI formula, which is rather complicated but basically good. A number of other large buyers, still a minority, have rule-of-thumb methods. They feel, for instance, that new equipment is justified if the calculated saving will amortize the equipment in three or four years, even though the tax laws require amortization over 10, 15, or 20 years.

In our experience in selling capital goods, 70 to 80 per cent of new equipment is purchased for expansion purposes—that is, new capacity rather than modernization of existing equipment.

"Competitor More Efficient?"

MANY FOUNDRIES are losing orders to competitors who may or may not be foundries. Reasons for this loss may include price, quality, or delivery.

Each cast metals producer must conduct its own analysis to determine the reason or reasons for the loss of business or learn why it is becoming increasingly difficult to obtain new business.

It is easy to place the blame on increased costs of labor and materials. Is it not likely that the competitive foundry or forging shop also is paying more for labor and materials?

The foundry must realize that perhaps the competitor, to whom it is losing orders, may have a newer and more efficient operation.

Almost every foundry has so-called standard molding machines. Certainly the more recent ones, even of this type, are more efficient and have less maintenance and down-

"The competitor taking your business may have a new, better operation"

time than some of the older models. But will they produce as good or as many molds per manhour as the new types of machines?

Are you proud of your machine shop, yet hesitate to take visitors or customers into your foundry? It is surprising how many companies, many of which are not small, have efficient new machine tools but continue to operate items of foundry equipment, such as molding machines which are 20, 30, and even 40 years old. Why would a molding machine, operating under the normal adverse conditions of a foundry, last longer than a lathe or a planer that receives the best of care, lubrication, and maintenance?

Frequently, foundry equipment manufacturers prepare studies which prove that a modern installation can be written off entirely in three years, two years, or even one year. Realizing this, the progressive foundry operator proceeds with the installation. He then makes more molds per manhour, and the molds produced are of higher quality. This gain results in additional savings in other foundry operations.

Foundrymen, through reading, discussions, or visits, should familiarize themselves with the great progress their industry has made in the last few years.

Then they will realize the time to purchase equipment is now.

"Improved Controls a Must"

AVAILABILITY of equipment of new and improved design which will permit foundry process improvement will continue to be the most important factor in new equipment purchases by foundries. Control of process and of product quality will become dominant factors governing equipment design.

Greatest emphasis in recent years has concerned the reduction of direct labor cost. This interest has led to the development of highly mechanized and automated equipment for such operations as cupola charging, slagging, and tapping and for iron distribution and pouring.

This goal will not be abandoned, but it now is apparent that foundry equipment needs during the '60s will extend far beyond the area of labor-saving devices. Iron foundrymen will be faced with product quality demands far beyond past requirements. They will find it necessary to diversify the product metallurgically to include nodular and other specialized grades of cast iron and to develop the ability to produce a high degree of uniformity of properties in all grades.

In addition, foundrymen must

have new equipment to gain better control over processes. Improved process control will produce new economies as well as higher product quality standards. The water-cooled, hot blast cupola, already at an advanced state of development, is an important example of the type of equipment that is needed.

Other examples include facilities for protective storing and handling of raw materials and upgrading of raw materials; improved weighing and recording equipment; testing equipment; and special ladles with related equipment for inoculating or otherwise treating molten iron to improve properties.

The purchasing of such equipment should be determined by its availability since the demand for improved control already is being felt.

"Budgeted Buying Pays Off"

MANY scientific approaches have been made to the timing of equipment purchases. MAPI has an elaborate analysis form, and many large companies have forms of their own. Our company has a stylized type of analysis to tell when equipment should be purchased. Sometimes these scientific analyses tell the story, and sometimes they do not.

In our own plant, we have adopted a somewhat more empirical evaluation of replacement problems. We replace machine tools on an annual budgeting basis, selecting the oldest or least efficient tools for earliest replacement. We have replaced tools even when our industrial engineering surveys indicate a rather slow payout time. Making use of the double declining balance depreciation allowable, we find our cash position is not seriously impaired by that policy.

Too many foundrymen have considered purchase of equipment only when they need additional capacity, or when equipment is beyond repair. Obviously, that policy produces an antiquated, high-cost shop. Even some captive foundries are operated in this fashion. The foundry is the last to receive equipment appropriations, yet management cannot understand why the captive foundry cannot compete with the best of the commercial shops.

Since the labor cost of cleaning and finishing a casting is often greater than all the other labor charges, including melting, sand preparation, molding, coremaking, metal handling, and pouring, it is obvious that this is an area of great opportunity in cost reduction.

Foundries would benefit by scheduled and budgeted annual equipment replacements, rather than by waiting for inadequate production capacity or complete machine failure to set the replacement pace.

"When the money you are spending for maintenance and operating costs of old equipment is too high, it's time for replacement"

"No Two Foundries Identical"

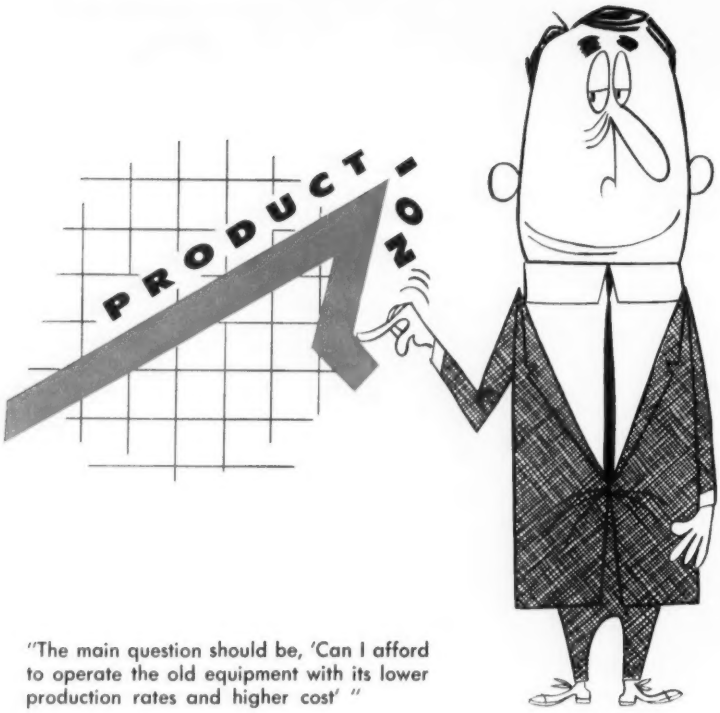
COMPETITIVE CONDITIONS require that better castings be produced at a lower cost if the individual foundry is to survive. The price foundrymen must receive for each casting is based primarily on existing operating costs. When those costs can be reduced with new equipment, then, and only then, is the time for the foundrymen to purchase it.

During the last ten years, equipment manufacturers have made many developments which increase foundry production per manhour. Automatic molding machines and sand, mold, and casting handling systems have been installed which have reduced the cost of producing castings.

Each foundry, however, must investigate thoroughly the degree of automation which can be justified, since no two foundries are identical. To assure the required return on the investment, foundry conditions must be analyzed carefully and equipment designed to suit the class of work and the production requirements involved.

Whether the equipment is an individual component to be added to an existing system, or a completely new molding unit, the savings which can be made must offset the cost of the new equipment usually within a period of two to three years, if the investment is to be justified. Current casting prices reflect the maintenance and operating costs of an existing unit. When these costs rise to such a point that a return cannot be realized on the investment, the purchase of new equipment is necessary if the foundry is to survive competition.

Many foundries are considering improvements to existing facilities, but hesitate to proceed because of current business conditions. The present buyer's market in the castings industry also exists for equipment manufacturers. This condition assures foundrymen that they will receive greater value for each dollar invested than may be possible in the future. Purchase of equipment at this time therefore



"The main question should be, 'Can I afford to operate the old equipment with its lower production rates and higher cost' "

will result in lower foundry costs since depreciation which must be allowed for all new equipment will be reflected in the cost of each casting produced.

Careful engineering is essential to guard against over-elaborate or expensive equipment for the individual foundry's requirements, for the installation of new equipment alone will not assure lower unit costs. Thorough engineering and proper design are as important as the type of equipment selected.

"Keep Up with New Methods"

MODERNIZATION of methods and procedures normally is associated with equipment changes, and since the search for better and improved methods is never ending, so also is the purchase of new equipment necessary to accomplish the end results.

Studies of molding line methods and procedures show that it is not uncommon to increase productivity, yet reduce manpower requirements greatly, by an arrangement of automatic or semiautomatic material handling equipment.

In most cases we have investigated, indicated savings will pay for the equipment in less than two years in either jobbing or production foundries.

Unless the individual and the company keep informed of rapidly changing methods and procedures, they may awake to find others are getting the business they previously merited. There is no fixed timetable for obsolescence. Today a foundry may be competitive; tomorrow, next week, or next month, it may not.

In the selection of new equipment, many objectives may be considered other than reduction in labor. Greater yield for the same manpower, improved quality of product, reduction in scrap loss, less fatiguing and less hazardous job requirements, flexibility of operations, reliability of production, and greater utilization of floor space are important.

It is mandatory that a wornout piece of equipment should be replaced. It should be equally mandatory that a wornout or obsolete process should be replaced.

Ridiculous statements such as "relatively new," "not written off yet," and "this is the way we always did it," are common reasons for resisting a process change, but they are only excuses for doing nothing.

It should be remembered that without the equipment, a company cannot merit the "orders" to justify the equipment, and when general automation is being given serious consideration, one should weigh the following quote from FOUNDRY, May, 1956: "The limit of automation on foundry operations will be reached when wages paid to the skilled maintenance technicians required to keep equipment downtime to a satisfactory minimum equal the wages of the semiskilled or nonskilled machine operators or helpers who would have been required had automation not been employed."

"Establish Buying Policy"

FOUNDRYMEN should purchase equipment when the investment will show a satisfactory return. Defining a satisfactory return is the sticker. If it can be defined directly in terms of money saved or earned in a given period, the decision becomes one of economics and expediency. Often the return must be defined in somewhat abstract terms, such as improved product quality, better labor relations, being a good neighbor, providing better working conditions, or keeping up with the competition.

Because it is practically impossible to set up a definite formula for equipment purchase, an equipment purchase policy should be established. This policy should take into account present facilities and requirements, proposed ultimate facilities based on estimated possible expanded sales, and intermediate steps to be taken as necessary or possible.

Unless such a long-range plan is established, equipment purchase becomes a matter of immediate expediency, and the foundryman will ultimately find he has "painted himself in a corner" so far as plant layout and work flow are concerned.

"Watch Trend in Processes"

IT CAN BE ASSUMED that foundries will continue the trend of modernization during the new decade. To determine when to purchase

equipment, foundrymen must be familiar with methods available to cut losses, improve the product, or apply new processes.

As an example, producers of plumbing goods castings are cutting losses by converting to electric furnaces adapted for melting leaded bronzes of the 85-5-5-5 type. Electric furnaces are being used with advantages in the melting of pure copper, aluminum, zinc, and iron. Automatic temperature control and integrated melting and casting facilities are being applied with electric furnace melting.

* * *

MANY foundry managers and engineers are considering future requirements of the automobile industry in both cast iron and aluminum. Although some believe that cast iron is here to stay, they also are doing experimental work in aluminum. Other engineers insist that the future is with aluminum.

If automobile engines continue to be made of gray iron, old equipment used by many foundrymen should be replaced. If the engines are to be made of aluminum, most will be diecast or poured in permanent molds.

"Obsolescence has no fixed timetable. Today you may be competitive; tomorrow you may not be"

In considering new equipment, foundrymen also should study new processes. For example, shell core programs have saved space and reduced production cost and at the same time they have permitted higher schedules to meet tonnage demands.

* * *

TO MEET today's production demands, equipment should be replaced when obsolescence or wear makes its operation uneconomical. It is unwise to continue using machines which are not able to meet increased demands efficiently. Most foundries today are making and handling more and larger castings than ever before. Their production on a competitive basis demands modern equipment. Foundry equipment should be replaced when methods improvement outmodes it economically.

"Housekeeping Standards Up"

FOUNDRIES have come a long way since everything was done by hand. Today mechanization is necessary if the foundry is to stay in business. As the standards of production are improved, other standards also move to higher levels. This transition affects not only the product, but also working conditions in the plant.

Improved housekeeping methods and higher standards of cleanliness bring the need for better tool equipment to perform housecleaning operations.

A heavy-duty, industrial-type vacuum cleaner can be used for floor cleaning on a regular schedule with maximum efficiency. The foundry becomes a better place in which to work, and lower insurance rates become possible.

Cleaning of overhead girders, stanchions, and even ceilings is greatly simplified with such equipment. From both a morale point of view (with the obvious implications of improved production) and a strictly monetary consideration, vacuum cleaning deserves the consideration of all progressive and profit-minded foundrymen. And, as with most new equipment which promises dual benefits, the best time to buy is indeed now.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

What Modernization Has Done for 3 Foundries

EFFICIENT CLEANING
West Michigan Steel Foundry Co.

CUPOLA MELTING
Cincinnati Milling Machine Co.

AUTOMATIC MOLDING
Auto Specialties Manufacturing Co.

THE CASE histories on the following twelve pages illustrate how installation of new equipment and modernization of facilities have raised efficiency, reduced cost, and improved casting quality in three foundries.

WHAT MODERNIZATION
HAS DONE FOR 3 FOUNDRIES

Fig. 1—Workers employ oxyacetylene torches and pneumatic chipping hammers to remove gates and risers

EFFICIENT CLEANING

New cleaning room, planned with customer in mind, provides for job lot handling of castings, individualized cleaning and heat treating, and one-man responsibility for hand cleaning work

By ROBERT H. HERRMANN
Associate Editor

● A CLEANING ROOM expansion and modernization program was completed in July, 1959, by West Michigan Steel Foundry Co., Muskegon, Mich., at a cost of $600,000. West Michigan Steel is a jobbing shop, producing commercial and low-alloy steel castings weighing 1 to 1000 lb.

The new cleaning room can process 85 tons of castings in a two-shift day. That is sufficient capacity to handle output of the previously expanded and modernized castings production section.

A team of four men under the direction of Dale P. Brautigam, plant engineer, was in charge of designing and equipping the castings cleaning department. Planning for the project was grounded on management's belief that customer satisfaction in terms of quality, delivery, and price is paramount. Key considerations in that concept are the following:

Castings of different types are and should be handled as individual products and not as the gross output of a bulk processing operation. Short-run jobbing production should be accomplished using high production methods to minimize the cost and time of cleaning castings without compromising the customer's individual specifications.

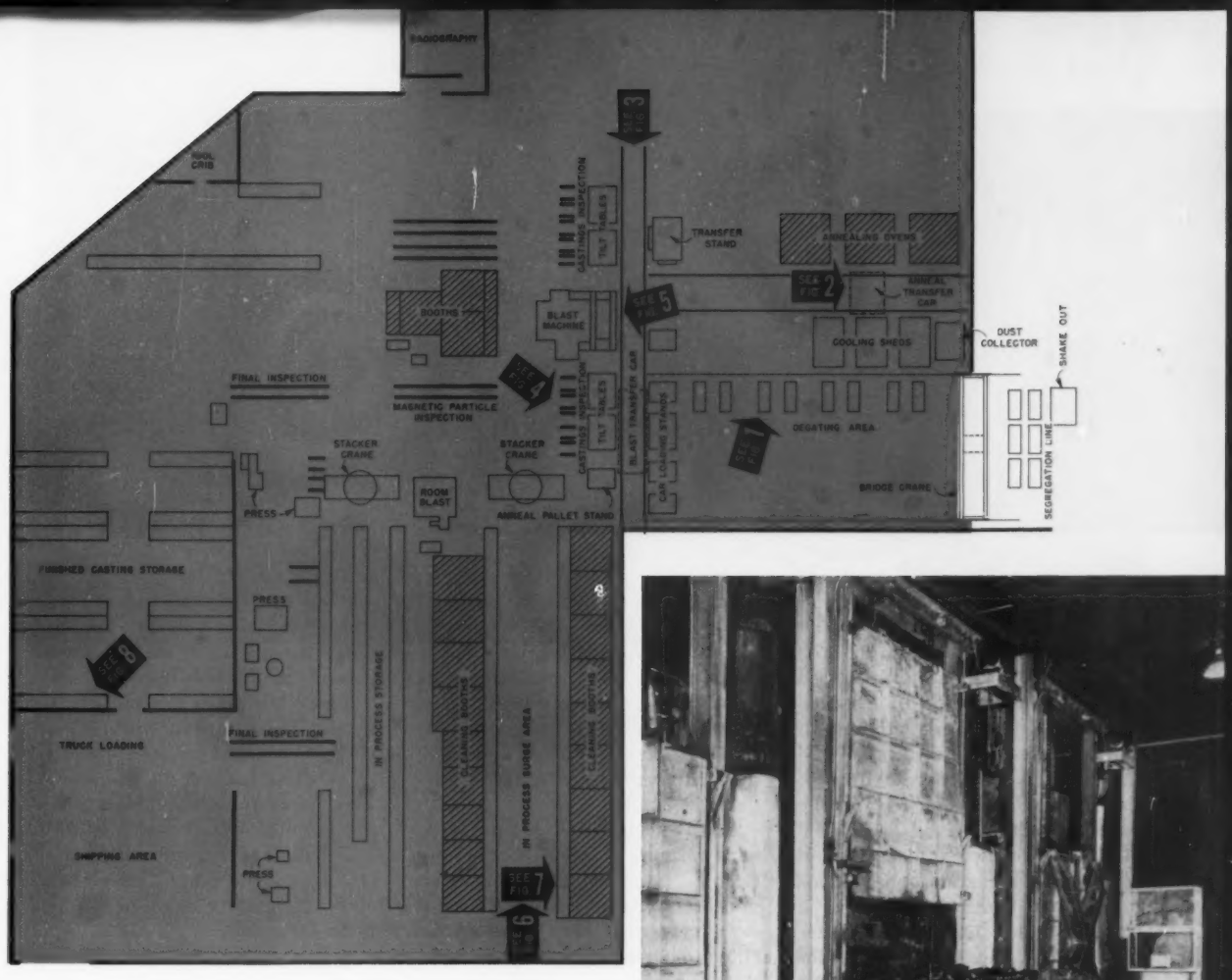
From those considerations, the following basic requirements were established as a guide for the modernization program:

1. Castings produced from each pattern must be segregated and handled as a lot from shakeout to the customer's plant.

2. A statement of the customer's specifications must accompany each lot of castings. Close control must be maintained over all cleaning processes to assure adherence to the customer's specifications.

3. The chipping, grinding, welding, arc washing, and gaging required to clean the castings from a given lot must be performed by one man at one place at one time.

4. In-process storage areas must be maintained for job lots of cast-



Floor plan view of the new castings cleaning room

Fig. 2—Operator controls reach-lift arms of anneal transfer car to set grids of castings into furnace

ings to permit satisfactory production control.

5. A finished castings storage area must be established for boxed and palletized castings to allow the customer to store a 30-day inventory of castings ready for shipment on a moment's notice. Conversely, if a customer's requirements are less than he anticipated, space must be available to store his castings until they are needed.

The storage facility also permits leveling of peaks and valleys of foundry production. During periods of low demand, production level can be kept up and a customer's castings made ready for shipment. This arrangement facilitates handling of peak demands and rush orders when they develop.

In providing facilities and systems to meet these basic requirements, management felt that standard processing and material handling methods should not be allowed to limit the planning. Great emphasis was placed on the need for new thinking and new concepts.

How the System Works — A bridge crane segregates castings from a floor-level vibrating shakeout to pallet-like steel grids. The crane also moves grids loaded with like castings to a nearby sand-covered floor area. Here, workers cut off heads and gates with oxyacetylene torches and pneumatic chipping hammers. The gating metal is allowed to fall to the floor where it is picked up by crane magnet and dropped in tote boxes for return to the melting department. Initial inspection of castings takes place at this point, and the customer's process specification sheet is attached to the casting lot.

Degated castings are loaded in lot quantities on three 4 x 7-ft cast steel annealing grids on a 6 x 12-ft pallet. The pallet rests on a stand along floor rails traversed by a self-propelled, operator-controlled, transfer car equipped with two reach-lift tables.

Air motors propel the car along the tracks, move reach-lift tables by

Fig. 3—Blast transfer car and related equipment serving the 100-cu-ft capacity tumble blast cleaning machine and castings inspection stations

Fig. 4—Castings are removed from tilted receiving boxes, inspected, marked for processing, and segregated into boxes

cable drive to either side of the car, and drive the pump for pressurizing the hydraulic system used to raise and lower the tables. Compressed air is supplied through a hose mounted on a take-up reel set in the floor between the tracks.

The car is positioned in front of the pallet stand, and one of the reach-lift tables is run under the pallet. It is raised with its load of three annealing grids and brought to the car, which carries it to a transfer stand. A second transfer car equipped with one set of reach-lift arms operates on tracks placed 90 degrees to those just described and terminating along one side of the transfer stand. Arms instead of tables must be used on this car to clear pedestals in the annealing ovens. The arms lift the three grids loaded with castings from the pallet and move them back to the car. It transports them to one of three annealing ovens and sets them on castable refractory piers in the oven.

The car removes grids of heat treated castings from an oven and puts them in one of three natural draft cooling sheds along the tracks opposite the ovens. Cooled castings are taken back to the transfer stand for movement by the other transfer car to the pallet loading-unloading stand.

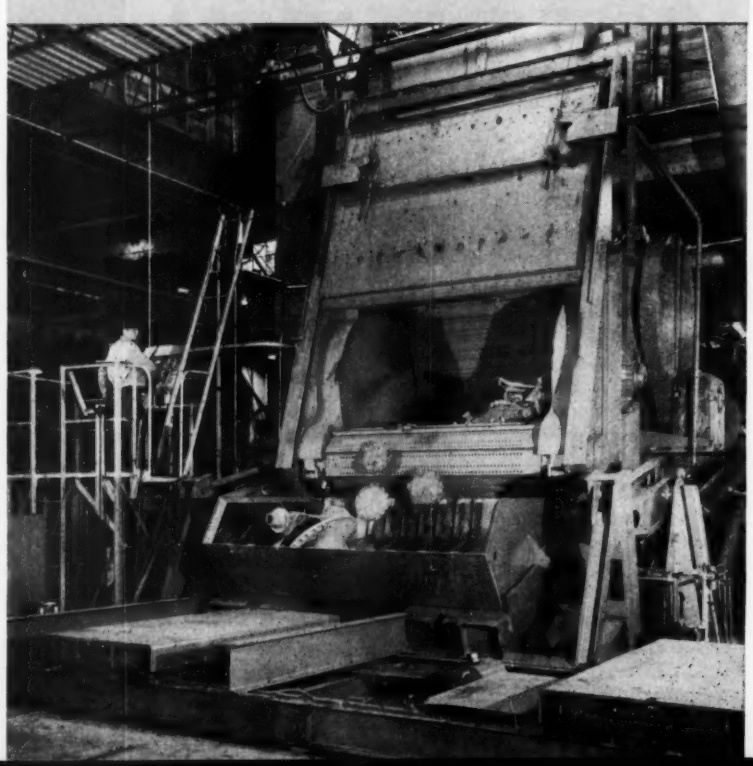
The transfer car system of handling castings was designed to provide rapid turnover of small lots of castings. Each customer's castings can be custom annealed regardless of quantity ordered. The arrangement of the annealing furnaces and cooling sheds plus transfer car handling of castings have increased effectiveness of the heat treating operation. Oven doors are opened for a very short time during loading and unloading. Consequently, the oven lining loses very little heat. Heating and refractory costs are reduced, and time to bring ovens up to heat is shortened. Repeated heating and cooling of a refractory anneal car is eliminated.

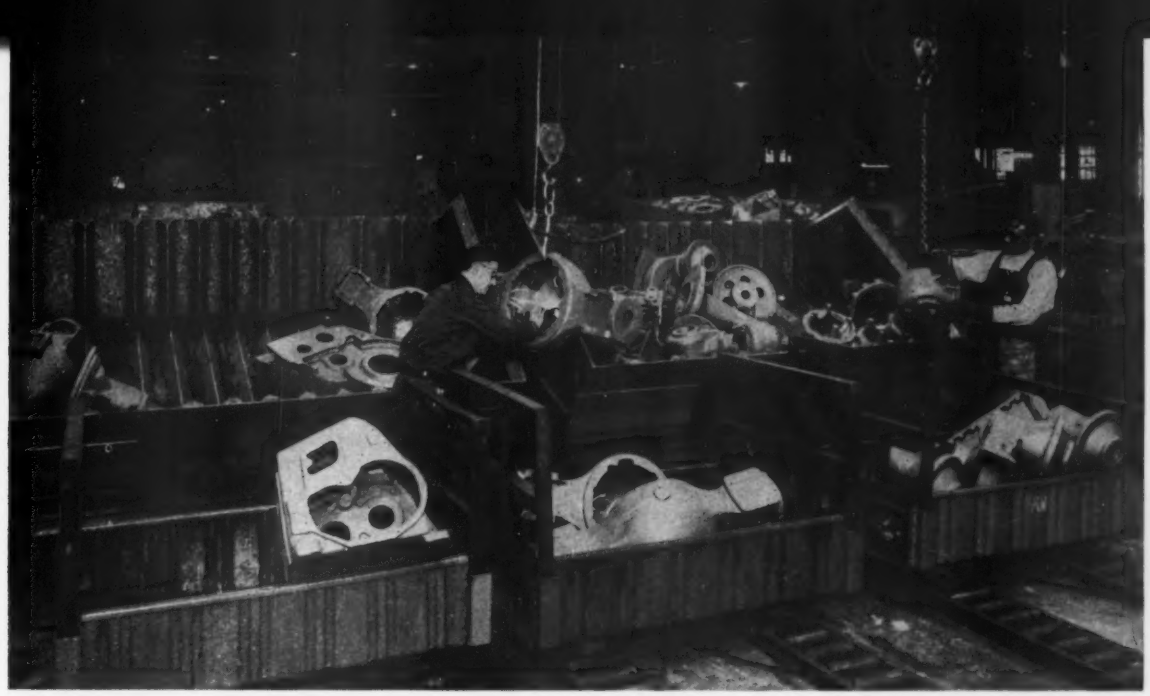
Blast Cleaning—A bridge crane with magnet transfers heat treated castings from the annealing grids to loading boxes for the 100-cu-ft capacity airless blast tumble machine. The specially-designed boxes are 7 ft wide and 8 ft long. They have angle iron reinforced, sloping bottoms and suitable lugs mounted externally for positioning and holding them on the cradle of the cleaning machine loading device. Receiving boxes are constructed similarly but are 10 ft long to extend beyond the machine opening.

Three loading boxes and five receiving boxes are an integral part of the loader system and are sized to handle a lot quantity of castings. The 100-cu-ft capacity blast cleaning machine was chosen because it will handle a full anneal load of castings at one time, thus perpetuating the plan for handling castings in lot quantities.

A loading box full of castings is

Fig. 5—Castings receiving boxes held on the loading-unloading device of the cleaning machine may be tilted to adjust distribution of castings falling from the machine. Operator at left controls all operations





lifted from its stand by one of the reach-lift tables of the blast machine transfer car and moved to the cleaning machine. The second reach-lift table removes a box of cleaned castings from the machine loading device. The car is repositioned to align the first table with the loader cradle tracks. The table rolls into the loader, drops the full loading box on the cradle and retracts to the car.

The loader is a specially designed hydraulic-cylinder-operated, cantilever arm type unit. During the machine loading cycle, the cradle tilts the box as it is raised in the proper arc to dump castings into the machine. During the unloading cycle, the cradle, carrying receiving boxes, can be tilted hydraulically to adjust loading of the box as castings tumble from the cleaning machine. An operator stationed at a control board governs individual functions of the machine, or he may place the machine in automatic operation for a complete cycle.

Castings Inspection—The transfer car moves a box of blast-cleaned castings from the machine to the inspection area where it is deposited on one of several inspection tables. These tables are tilted hydraulically by the inspector, allowing him to raise the rear of the box progressively, sliding the castings toward him for easy and safe access. Castings are hoisted from the box by a small bridge crane, and, with reference to the customer's process specification sheet, are inspected, marked for processing, and placed in tote boxes resting on short lengths of roller conveyor on the floor. Loaded boxes are rolled a few feet to a stacker crane runway.

The production control office establishes a process priority at this point, and casting lots are taken by a stacker crane to in-process storage on four-level, tiered racks along each side of a 20-ft runway. The stacker crane removes boxes of castings from storage and delivers them in order of process priority to predesignated processing booths behind the racks.

The booths are 12 ft high and of three sizes, 10 x 10, 12 x 12, and 10

Fig. 6—Operator-controlled stacker crane handles box loads of castings to and from in-process storage racks and to roller conveyors at floor level. These service the processing booths situated behind the racks

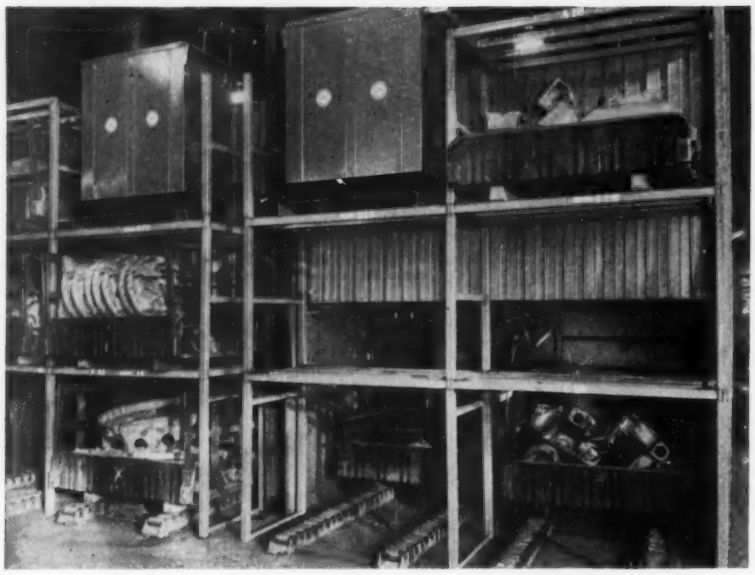


Fig. 7—View into sound-proof processing booth where worker cleans the castings. Fumes and smoke are exhausted through a slotted panel at right rear

x 14 ft. Storage rack widths are such that two of them extend the full opening of a booth. Floor roller conveyors extending into the booths are centered under each set of racks. Boxes loaded with castings roll into the booths on one set of conveyors and out of the booths on the other set.

Wall and ceilings of each booth are lined with glass fiber soundproofing material, a light level of 40 ft-c is maintained by fluorescent lamps, and a forced exhaust system rids the booth of air contaminants through a slotted grid in the back wall. Separate lines supply air at 90 psi for chipping and grinding tools and with air at 120 psi for arc washing equipment. Power for arc washing and welding in each booth is supplied by a 1000-amp rectifier welder located on the rack in front of the booth, with remote controls and a reverse polarity switch mounted inside the booth.

Other equipment includes hand-operated bridge crane with air hoist for handling castings anywhere in the booth. A mechanical work positioner greatly facilitates processing of castings. The castings are clamped in a fixture on the universal head of the positioner, which is constructed to counterbalance the casting. A worker moves the casting to any position by hand for chipping, grinding, arc washing, welding, and gaging as required to meet customer specification. One worker in each booth is responsible for a properly finish-cleaned casting in accordance with the customer's process specification sheet.

Final Processing and Storage—The stacker crane transports boxes of cleaned castings back to the floor-mounted roller conveyors at the inspection station. A bridge crane loads castings to anneal racks for a second trip through annealing ovens, blast cleaning, and inspection. Box loads of castings are moved to a second in-process storage rack area to be scheduled, according to production control priority and customer's process specification sheet, through final magnetic particle inspection, touch-up blast cleaning, straightening, and final inspection.

The second in-process storage area consists of three rows of four-tiered racks situated in a bay between the processing booths and the castings straightening bay. A second stacker crane serves this storage area, the straightening presses, and other processing stations.

Castings in lot quantities then go through final inspection to shipping where they are palletized or boxed. Casting lots which are to be shipped immediately are fork trucked to the shipping platform. Lift trucks carry all other finished castings to a series of racks in a storage area. This finished casting storage area permits assembly of complete orders before shipment and the maintenance of up to 30 days' inventory of a customer's castings.

Major equipment suppliers for the new cleaning room include All State Engineering Co., Milwaukee; Aronson Machine Co., Arcade, N. Y.; Chicago Blower Corp., Franklin Park, Ill.; Equipment Manufacturers Inc., Detroit; Hewitt-Robins, Stamford, Conn.; Manning, Maxwell & Moore Inc., Shaw Box Crane & Hoist Div., Muskegon, Mich.; Master Power Corp., Bedford, Ohio; Miller Electric Mfg. Co. Inc., Appleton, Wis., and Wheelabrator Corp., Mishawaka, Ind.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

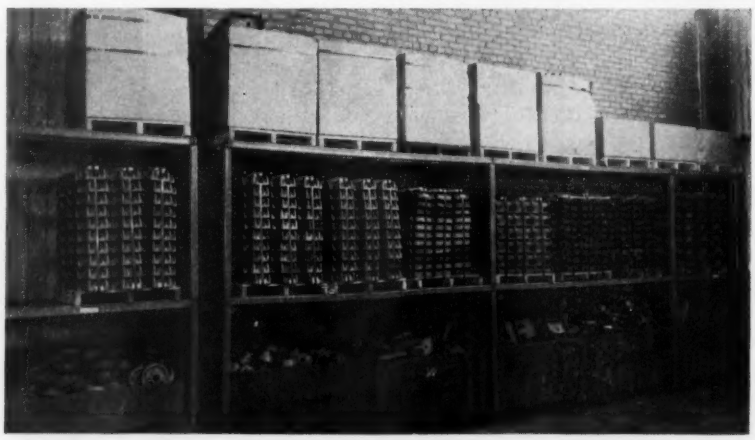


Fig. 8—Finished and inspected castings, boxed or palletized, may be stored until released for shipment to the customer

WHAT MODERNIZATION
HAS DONE FOR 3 FOUNDRIES

CUPOLA MELTING

Unlined, hot blast, controlled slag cupola produces molten iron with low silicon loss and closely controlled carbon. Refractory cost is minimized; coke consumption is reduced

By MARTIN E. ROLLMAN and DAVID J. PUSACK
Foundry Superintendent *Foundry Metallurgical Supervisor*
Cincinnati Milling Machine Co., Cincinnati, Ohio

● A MAJOR PHASE in the improvement and modernization of foundry melting facilities at Cincinnati Milling Machine Co., Cincinnati, recently was completed. A ten-year program in the evolution of melting practice from conventional acid lined cupolas, first to conventional basic linings, then to cold blast, water-jacketed basic operation, and finally to an externally water-cooled, unlined, hot blast, controlled slag furnace has yielded important quality improvements and economies.

Although conventional basic melting produced cleaner, hotter, and more economical metal than possible in acid practice, it resulted in serious problems with consistency of control over chemical and physical properties of the iron. It was recognized that the ultimate design for reducing these variations to a minimum would be the controlled slag, constant diameter cupola with associated air blast preheat for precise and rapid control of the cupola combustion zone. The generally well-known economies of this type of furnace such as reduced coke consumption, decreased silicon loss, and reduced refractory consumption were corollary benefits to the main objective of improved quality.

Description of Furnace — High-strength gray cast iron inoculated

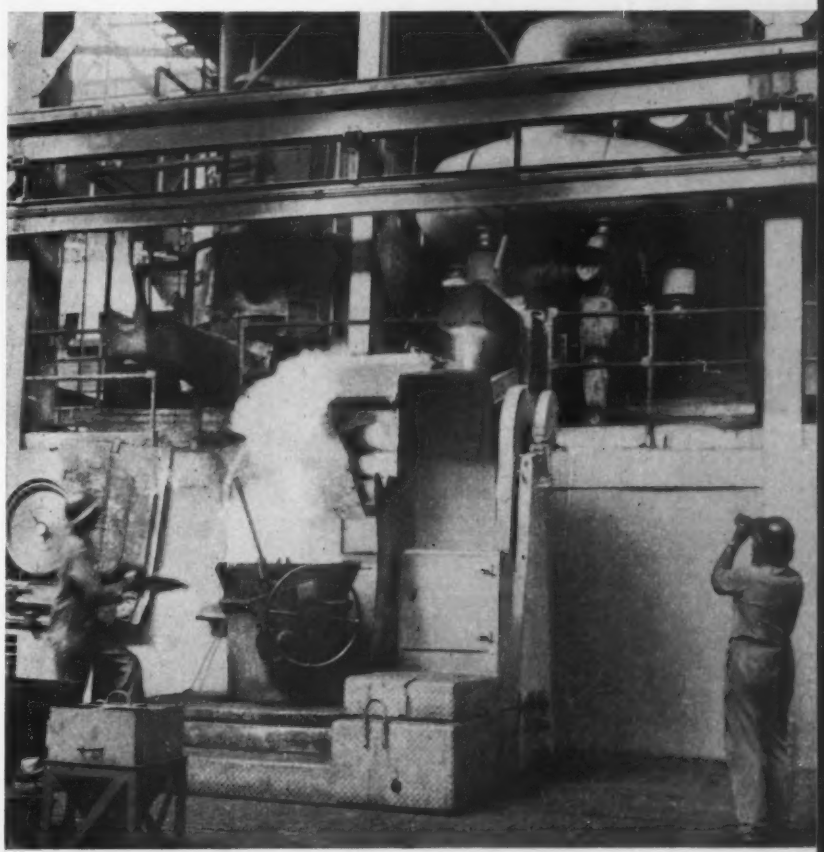


Fig. 1—Molten iron from the new cupola is being tapped into a ladle on a transfer car. Man at right is using an optical pyrometer to determine metal temperature. Iron inoculants are in containers at left foreground

with alkaline earth silicides under licensing agreements is produced in the new cupola. This metal, modified by ladle additions of ferrosilicon and special-purpose alloys as necessary is poured into machine tool castings ranging from 1/4 to 12-in. section size and from a few ounces to 40,000 lb. Fig. 1 shows the new furnace in operation.

The furnace melting section is a 1-in.-thick mild steel shell 13 ft tall rolled in a conical shape. Diameters of the various zones are 78 in. in the well, 54 in. at the top of the combustion zone, and 50 in. at the top of the preheat zone. This section is cooled externally by a curtain of water applied at the top of the preheat zone. Six fabricated copper, water-cooled tuyeres are installed with a projection of 12 in. beyond the internal face.

External cooling is employed on the well section of the furnace. Total water flow is 250 gpm through an induced draft, evaporating cooling tower and recirculation system (Fig. 3). The pumping system is protected against failure 24 hr a day by an emergency city water supply operating through a check valve and automatic solenoid valve. These valves are actuated either by power failure or by thermal devices on the cupola shell.

Installation of the furnace melting section was accomplished by adding structural support to an existing 66-in. diam charging door and stack and cutting away the old melting section and bottom plate. The new section was slipped into place and adapted to the existing stack through an expansion joint and flange.

Refractory Construction — The charging section is lined with heat-resistant cast iron block to below the expansion joint. The preheat and combustion zones of the cupola down to tuyere level have no refractory lining. The combustion zone during operation is partially insulated from the water cooling effect by inert coke and slag adjacent to the shell. The well section of the cupola is laid up with large carbon blocks against a backing of 9-in. carbon arches.

Ten large pieces originally were set with hoisting equipment to reduce joints to a minimum. These blocks are repaired weekly with a 2 or 3-in. rammed facing of carbon paste and to date have shown a service life in excess of 18 operating months. No carbon block replacement in the near future is antici-

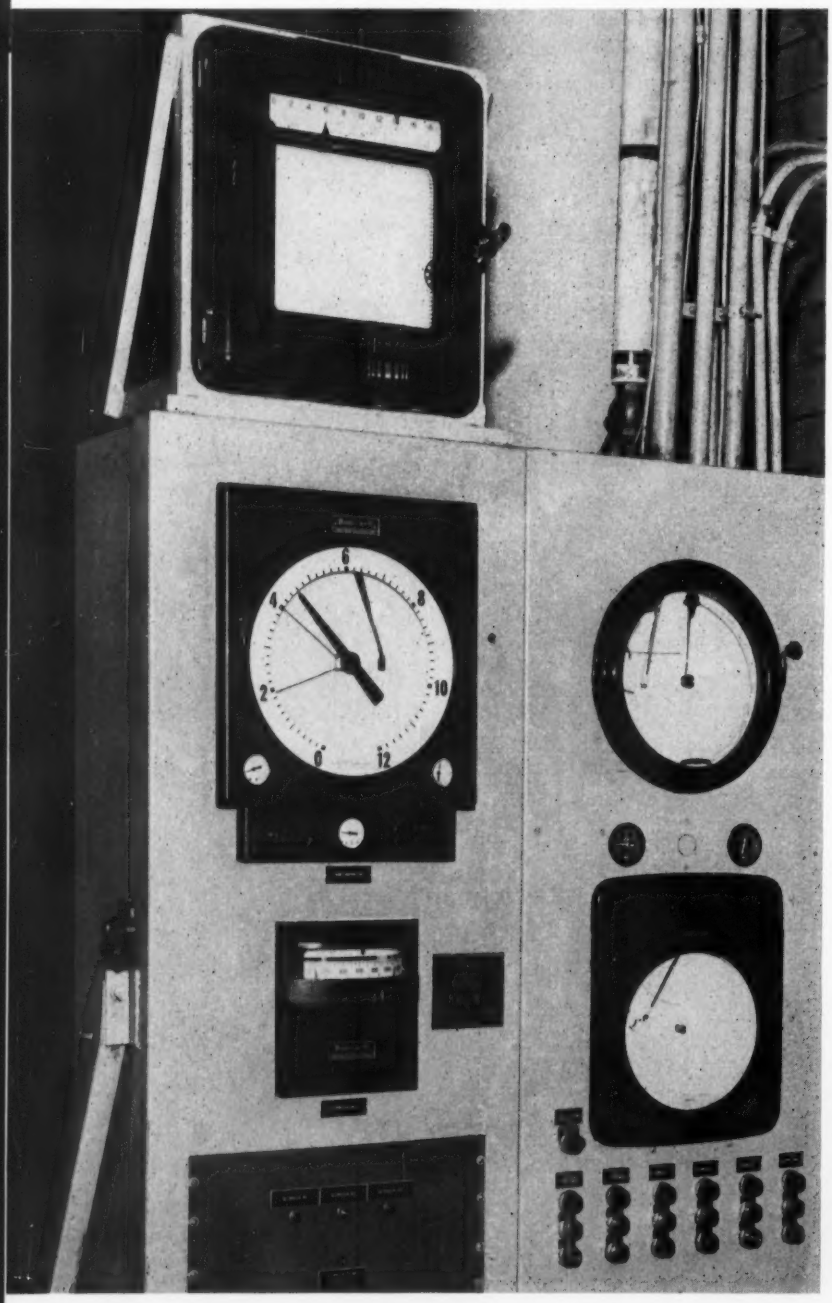
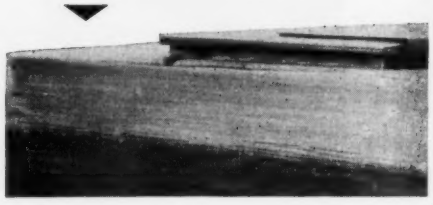


Fig. 2—Furnace control panel records and controls stack gas temperature, bustle pipe pressure, and blast air weight

Fig. 3—Induced draft tower has capacity to cool water recirculated through two cupolas which are operated simultaneously



pated under present operations.

The cupola breast is formed by one large carbon block projecting through the shell into the runway. A milled slot through the block is filled with two replaceable refractory wedges that form the front slagging tap hole. The runway is lined with chrome magnesite burned bricks where iron flows and carbon bricks where the slag flows. During operation the carbon bricks in the runway are protected from oxidation by a loose layer of vermiculite.

Hot Blast Equipment—Blast air is preheated by a vertically-finned, externally fired unit having three tubes mounted in parallel to heat the air to 700° F at normal blast volume of 4600 to 4800 cfm. The fuel may be either gas or oil. The heaters are provided with a modulating type of control, Fig. 2, to maintain small temperature variations.

Heater protection is provided by high limit controls which are interlocked with the fuel supply. Air weight control is employed and the air is delivered from the finned tubes through a bustle pipe and six downcomers to the tuyeres. Minimum floor space is required for this type of blast preheater since the space between the operating deck and the roof line is utilized.

Operating Conditions — The cupola currently is being used for five consecutive one-shift working days before dropping the bottom. Total melting time for the week is 45 hr. The melting rate at 4800 cfm and 14 per cent coke with 500-600° F blast temperature is 10 to 11 tons per hour. At the completion of melting each day the cupola is drained of the last slag and iron through a drain hole at the bottom of the U-trap in the runway. The taphole is plugged full length with a sand filled black iron pipe and the bed is banked with 500 lb of coke.

The following morning a new coke bed is constructed on top of the residual hot coke to a height of 45 in., using 2500 cfm of preheated air. This operation takes about 30 minutes. Charging is begun, full air turned on, and metal is tapped by oxygen lance in 25 to 30 minutes.

Special consideration must be given to the initial melting conditions of an unlined, water-cooled cupola that has been banked. Every effort is directed toward producing satisfactory metal fluidity by utilizing additional coke, high initial bed height, higher blast volumes, adequate preheat of burden, and preferred charging materials during the first half hour.

Empirically determined combinations of coke percentage and flux basicity along with other operating conditions establish the mean level of carbon content. During operation, changes in carbon level are corrected by varying the blast temperature in increments of 25° to 50° F as carbon content is reported by the laboratory at half-hour intervals.

The metal charge consists of malleable and silvery pig irons, steel briquets, cast iron briquets, domestic returns, and ferroalloy briquets. Optical pyrometer measurements of metal temperature indicate 2800-2900° F utilizing steel mixtures in the range from 30 to 40 per cent.

Maintenance of the carbon well and runway is accomplished in a half day on Saturday with a small crew. The bottom doors are covered with a rammed layer of green molding sand faced with a 2-in. layer of alumina refractory. Hot coke is charged to the cupola at the completion of this work in preparation for Monday morning melting.

Conclusion—The original objectives of the installation are now being attained in full measure. Excellent carbon control of the metal is being achieved. Silicon losses have been reduced to approximately two-thirds of the former loss in basic melting. Coke savings are in the range of 15 per cent. Refractory consumption is an irreducible minimum, with internal patching costs having been reduced from $4.55 per ton of iron to less than 25 cents per ton.

Major suppliers of equipment and services for the cupola installation are:

Brown Thermal Development Co., subsidiary of Brown Fintube Co., Elyria, Ohio.

Harbison-Walker Refractories Co., Pittsburgh.

The Marley Corp., Kansas City, Mo.

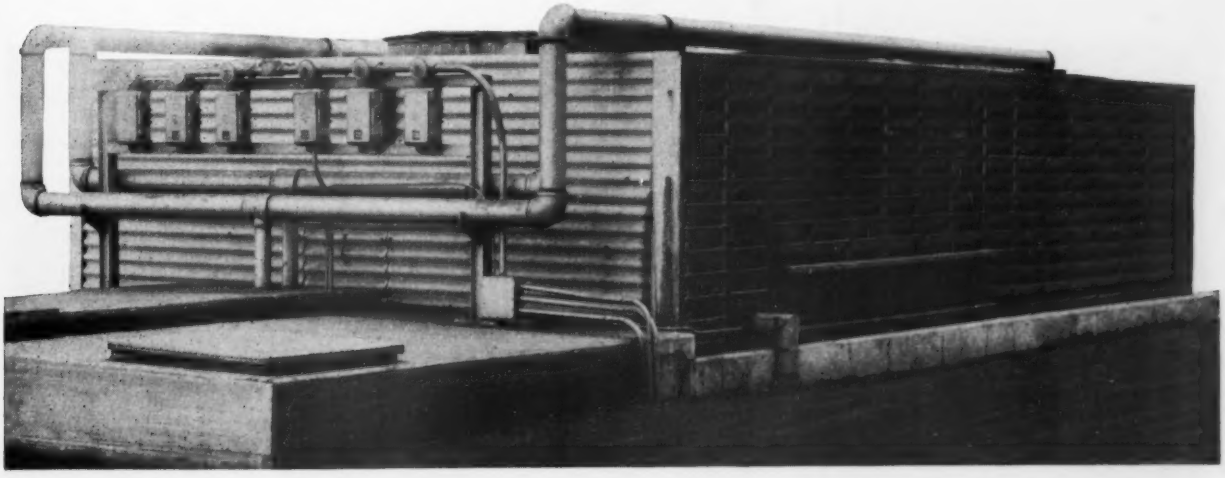
Meehanite Metal Corp., New Rochelle, N. Y.

Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia.

National Carbon Co., division of Union Carbide Corp., New York.

Whiting Corp., Harvey, Ill.

● For an extra copy of this article, until supply is exhausted, use card on Page 53



WHAT MODERNIZATION
HAS DONE FOR 3 FOUNDRIES

AUTOMATIC

Mechanized molding line has increased production, improved casting quality, reduced manual labor, lessened pay rate problems, and aroused new interest among employees for foundry work

● AN AUTOMATIC blow squeeze molding machine produces cope and drag molds simultaneously at the rate of 330 an hour on a new line at Auto Specialties Mfg. Co., St. Joseph, Mich. Malleable iron automotive castings poured in the molds range in weight from 2 to 12 lb.

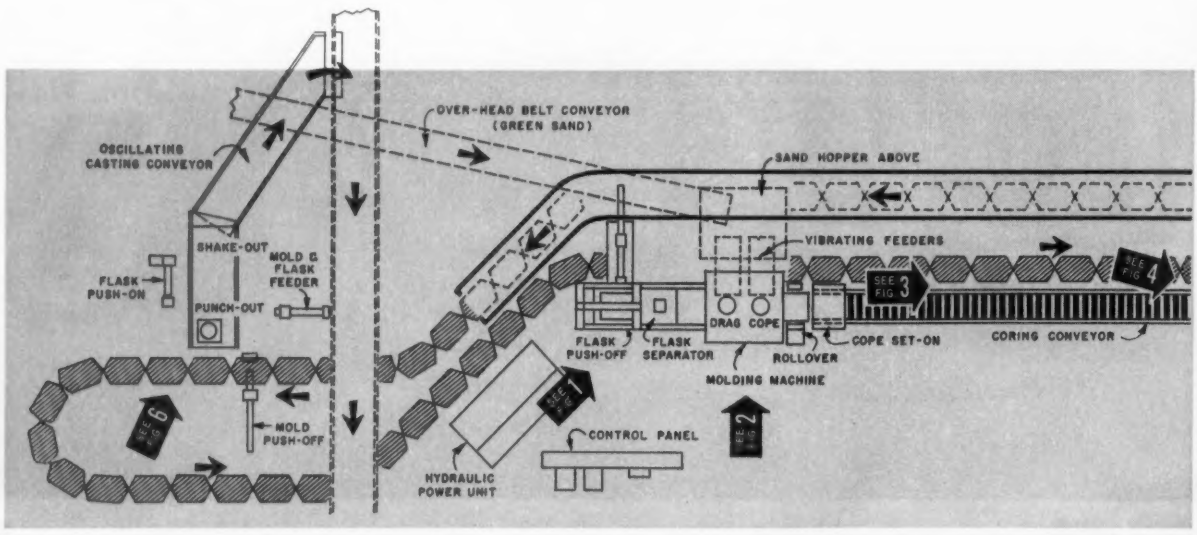
Flasks used on the line measure 16 x 19 x 8 in. deep to form a mold 16 in. high. This size was selected because it will handle about 75 per cent of the jobs produced at the foundry.

Line Is Mechanized—Except for core setting and pouring, the new line is self-operating for continuous production. Assembled cope and drag flasks approach the molding machine on a car conveyor loop. An air cylinder ram pushes the flasks off the car to a steel shelf at the entrance end of the molding machine feed line which parallels the car conveyor. Another air cylinder ram pushes the assembled flasks from the shelf to locating cutouts in the plate steel frame of a shuttle. The hydraulic-cylinder-propelled shuttle frame rests on a wheel conveyor in such a manner that about half the width of the wheels extends into the cut-outs. Flasks held by the cutouts ride on the inner halves of the wheels.

When the drag flask is positioned in the shuttle frame, an upper shuttle lowers to grasp the cope flask, lifts it off the drag, and moves forward one flask length. At the same time the lower shuttle, carrying the drag flask and a cope flask previously placed in the other cutout, moves into the machine and pushes out two rammed flasks.

The empty flasks now are positioned over cope and drag patterns bolted to tables mounted on separate hydraulic cylinder rams. The patterns are brought up between the rows of conveyor wheels to engage the inner edges of the flanges at the bottom of the flasks and lift them to the machine for the blow and squeeze operations. The shuttle moves back against the flask receiving shelf, and the cope flask previously lifted from the drag is lowered into the front cutout of the shuttle frame.

Blown and squeezed half molds are lowered to the wheel conveyor and the patterns drawn from the mold halves. When the patterns come to rest in the starting position they are sprayed with parting liquid. Molds are rammed to a hardness of 90-97 depending on the



MOLDING

By ROBERT H. HERRMANN
Associate Editor

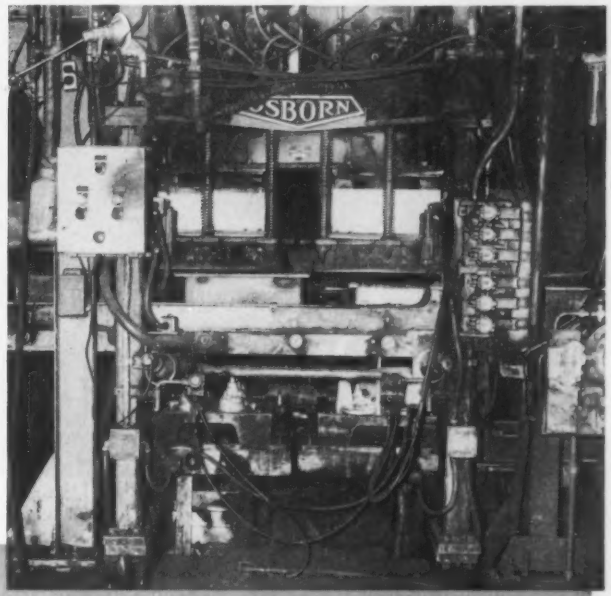
Fig. 1—When assembled flasks are positioned in molding machine feed shuttle, an overhead shuttle removes cope flask and moves to right to lower the flask to feed shuttle on next cycle

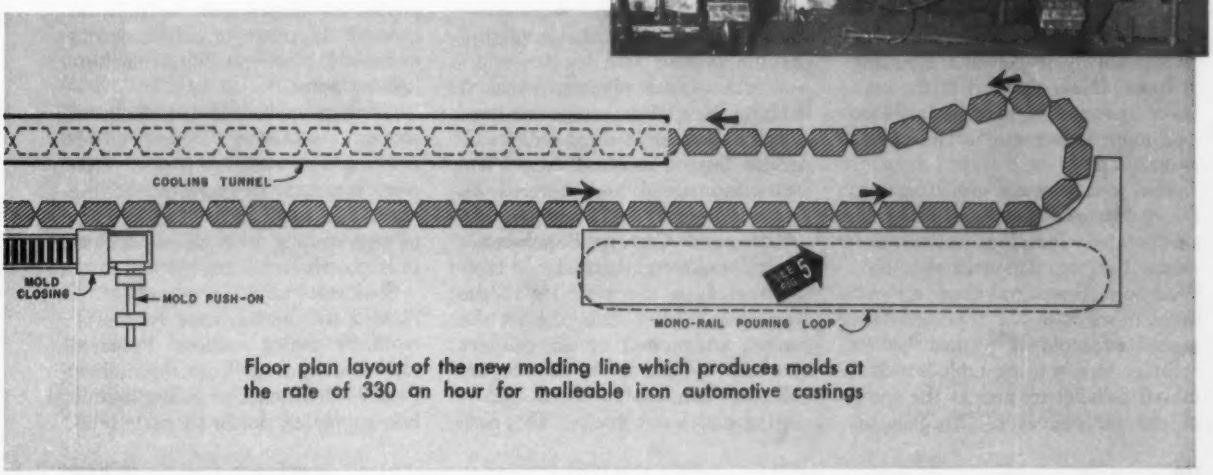
job. Hardness on vertical mold walls averages about five points under the over-all hardness of the molds.

Drag Is Rolled Over—As the half molds are pushed out of the molding machine, the cope rides through a rollover to a lowering device, but the drag is held by protuberances on the flask. They also trip a limit switch to actuate the hydraulic mechanism which inverts the drag. Because the rollover is mounted eccentrically, the drag arrives, face side up, at a lower level. The cope previously has been lowered to a powered wheel conveyor at that level. An air cylinder pushes the drag from the rollover to the same conveyor.

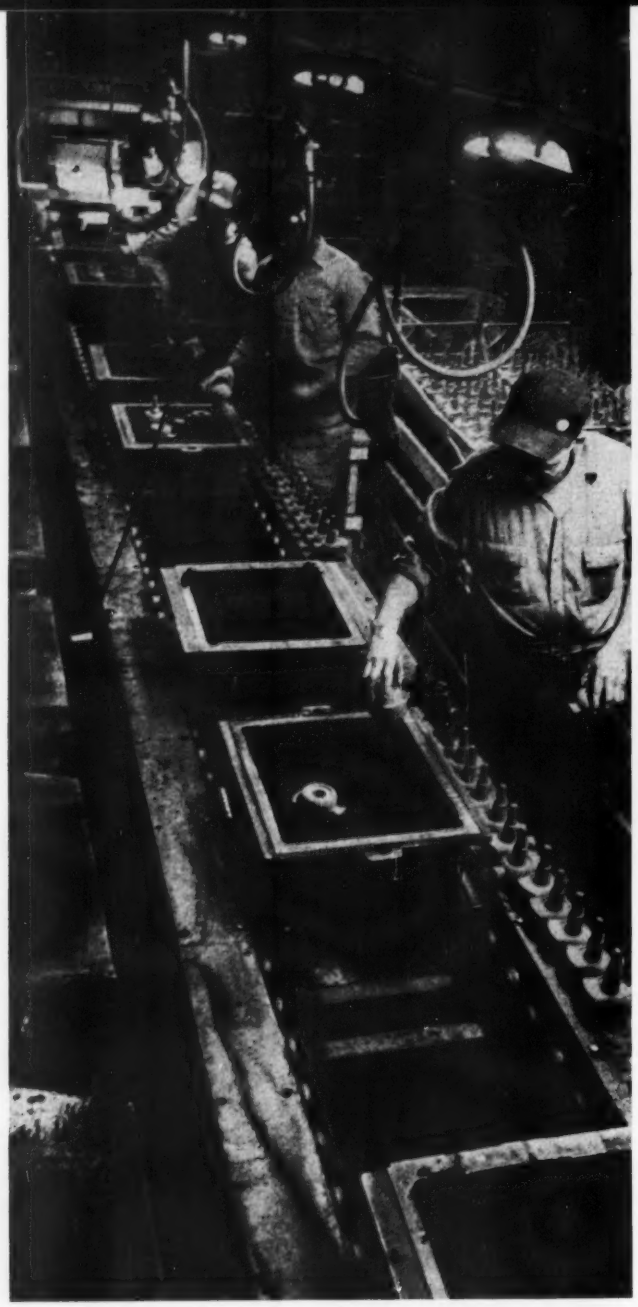
Wheels in the first part of the conveyor revolve rapidly to clear the rollover and lowering area. Wheels

Fig. 2—Finished half molds are shown moving to the right, out of the machine. Cope and drag patterns on tables of separate hydraulic cylinder rams are visible under the flask conveyor





Floor plan layout of the new molding line which produces molds at the rate of 330 an hour for malleable iron automotive castings



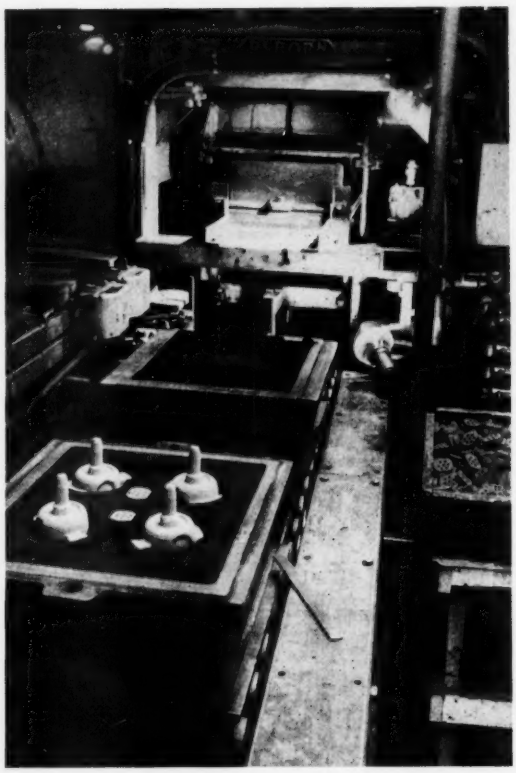


Fig. 4—Close-up shows cope preceding drag into mold closer. Air cylinder beyond the closer pushes molds to car conveyor

Fig. 3—Workers set cores in mold halves propelled by powered wheel conveyor to the closing machine shown at top left

in the midsection of the conveyor revolve slowly to permit the setting of cores. Near the end of the conveyor the wheels revolve faster to feed mold halves into a closing device.

The cope precedes the drag into the mold closer and is raised by an air-operated clamping device which grasps the top flange of the flask. When the drag enters, an air cylinder raises it to the cope, and the assembled mold is pushed by air cylinder to a waiting table which is moved parallel to, and at the speed of the car conveyor. Another air cylinder ram pushes the mold to a car.

Workers on a platform about 2 ft above floor level pour molds from hand-pushed, hand-tilted ladles suspended from a monorail loop. The ladles are raised and lowered by electric motor.

Automatic Casting Punch-out—Poured molds travel through a cooling tunnel on the back leg of the loop and, as they emerge from the tunnel, are pushed by air cylinder ram to a waiting table. Another air cylinder ram moves them into a casting punch-out device. This consists of a flask holder raised by air cylinder to stationary rams which push sand and castings to a vibrating shakeout below. The holder lowers, and the next mold entering pushes the empty flasks to a waiting table which moves at car conveyor speed as an air cylinder pushes the empty flask assembly to a car of the conveyor, which carries it around to the molding machine loading point.

Castings come off the shakeout to an oscillating feeder which empties to an apron conveyor. That conveyor, carrying castings from the other two small parts lines ascends to near ceiling level to move castings to the cleaning room.

Shakeout sand is moved to a divided storage bin over two automatically cycled mullers. Prepared sand is discharged from the mullers in 2200-lb batches to a distribution belt supplying the small parts lines.

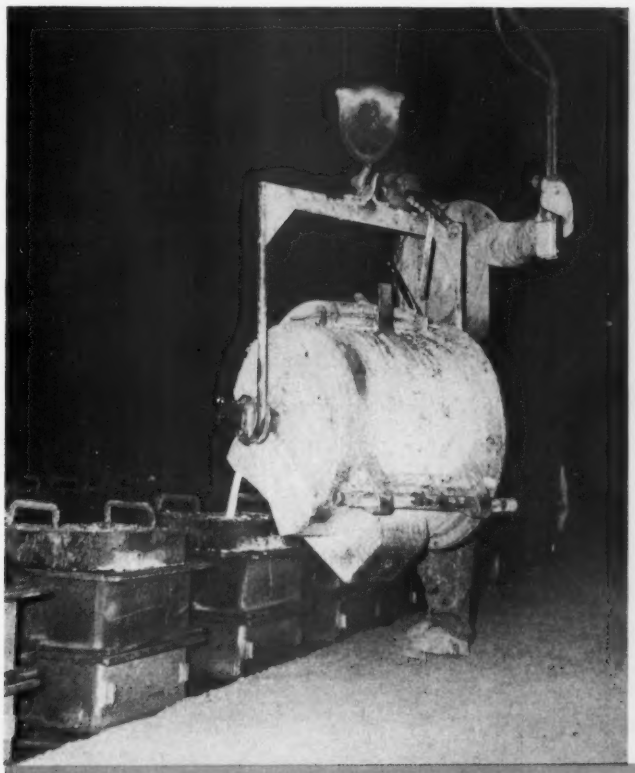


Fig. 5—Workers on an elevated platform pour molds from hand-pushed, hand-tilted ladles suspended from electric hoists on a monorail conveyor loop

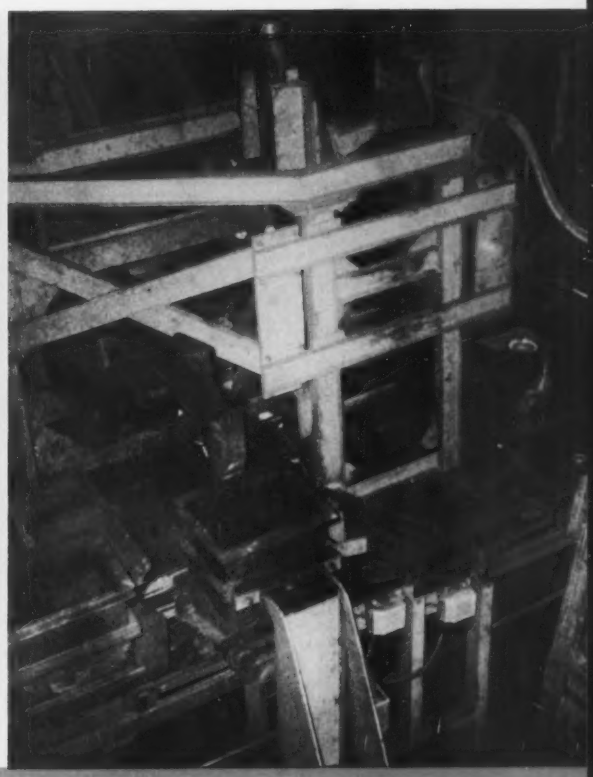


Fig. 6—Mold at right will be pushed into casting punch-out device, center. Air cylinder ram pushes flasks in center foreground back to car conveyor

On the new line sand is delivered to a divided hopper supplying the cope and drag sides of the molding machine. A vibrating feeder under each leg of the storage hopper feeds each half of a divided supply hopper mounted on the machine. A sand level probe in each half of the supply hopper controls operation of the feeder.

New Line Advantages — Molds produced on the new line are uniform. Mold hardness can be varied as desired by varying hydraulic pressure at the squeeze. Also, defective castings due to mold shifts have been eliminated. A uniform mold height and sprue location have improved pouring practice.

Standard size, easily changed pattern plates are used. They may be changed in less time than required to change various size plates on the eleven machines on each of the older small parts lines. No jackets are required and standardization of the size of flask used reduces handling and storage problems. Practically no sand is spilled at the molding station. Consequently, housekeeping chores are minimized and no equipment for handling spilled sand is used.

Heavy manual labor, particularly lifting and handling jobs, has been eliminated from the line. Furthermore, exposure of workers to possible injury has been reduced considerably. Mold making, closing, break-up, and shakeout are mechanized completely. As a result, workers like the new line and are applying for transfers to work on it. It has aroused new interest among employees for foundry work.

Depending on the type of job being run, the new line will operate with five men: An electrician-maintenance man, one foreman who operates the line, one core setter, and two iron pourers, or with a maximum of 13 men: Electrician-maintenance man, foreman, five core setters, two core delivery men, one weight shifter, and three iron pourers.

This compares with each of the other small parts lines which requires 21 workers: Eleven molders, three pourers, one weight shifter, two jacket shifters, two core delivery men, one foreman, and one mold counter.

Pay rate problems also are reduced because rates are standard for every molding job run on the line. Variations in types of molds are accommodated simply by varying the number of core setters and iron pourers. In contrast, incentive rates have to be recalculated for every pattern change on every molding machine of the other small parts lines. Net result of the new, simpler policy is that workers like it and so does management. Office work required to calculate and adjust rates continuously is reduced, and potential labor controversy is minimized.

Major equipment suppliers for the new line include Jeffrey Mfg. Co., Columbus, Ohio; Link-Belt Co., Chicago, and Osborn Mfg. Co., Cleveland.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

View of downtown Philadelphia, to which the American Foundrymen's Society returns this year for the first time since the 1948 convention

Philadelphia Awaits 64th Annual

AFS CASTINGS CONGRESS

The annual AFS convention will attract an estimated 15,000 persons to Philadelphia May 9-13. Features include nearly 60 technical sessions and more than 200 exhibits of foundry equipment and supplies

● ABOUT 15,000 foundrymen and members of related industries are expected to gather in Philadelphia May 9-13 to attend the 64th Castings Congress and Exposition of the American Foundrymen's Society. Visitors will have the opportunity to see over 200 exhibits (see Page 171 for exhibitors) and to attend approximately 60 technical sessions (see Page 174 for program).

Convention Hall will be the site of registration, the exhibits, divisional luncheons, and all technical sessions except the six evening shop courses, which will be held at the Sheraton Hotel. The annual banquet and the sand division dinner also will be at the Sheraton, and the Canadian dinner will be at the Benjamin Franklin Hotel.

Technical Program — Approximately 100 papers will be presented at technical sessions during the week. Sessions will cover such areas as gray iron, steel, malleable, brass and bronze, light metals, diecasting and permanent molding, heat transfer, sand, fundamen-

tal subjects, plant and plant engineering, ductile iron, patterns, and industrial engineering and costs. Two special programs include a brass and bronze seminar and a symposium on solidification. The latter will be broken down into discussions of general principles, steel, cast iron, aluminum, and copper alloys, plus a summary. "Depreciation of Foundry Equipment" will be discussed by Richard McNabb, Machinery & Allied Products Institute, at the management development luncheon.

Speaker at the sand dinner will be Dr. Ylian Kekhendzy, professor of technical science and dean of foundry production, Leningrad Polytechnic Institute, Leningrad, Russia. Other foreign speakers will come from England, Belgium, and Australia, in addition to those from Canada. Of the 217 speakers and panelists who will take part in the technical program, 65 represent Canadian and other foreign industries, universities, and government agencies.

Shop Courses—Shop courses will include two on malleable iron, two on gray iron, one on sand, and one on ductile iron. All will be presented at the Sheraton Hotel at 8 p.m. on various evenings. With the exception of the gray iron courses, which will deal with fundamental behavior of gray iron, all will present panel discussions. The malleable meetings will take up casting design and melting materials and procedures; the sand course, on "New Horizons in Sand Practice," will cover green sand, air setting binders, and shell molds; and the ductile iron subject is methods of alloying.

Exhibitors' Theaters—An innovation at the exhibition hall will be two theaters which will offer special schedules of programs by exhibitors to show applications of their supplies and equipment and to provide information concerning them. Some exhibitors will conduct modified seminars, including actual laboratory techniques. Each will have about one hour on a definite schedule, which will appear in the official convention program.

Business Meeting—Exhibits will be closed Wednesday morning, at which time the annual business meeting will be held. The program includes an address by President Charles E. Nelson, the election of officers and directors, apprentice contest awards, and presentation of AFS awards of scientific merit and service citations (See Page 180). The Charles Edgar Hoyt Memorial Lecture then will be presented by W. J. Grede, board chairman, Grede Foundries Inc., whose subject is "Where Do We Go from Here?"

W. J. GREDE
Hoyt Lecturer

Nominees for election at the annual meeting include the following: President, Norman J. Dunbeck, vice president, Industrial Minerals Div., International Minerals & Chemical Corp., Skokie, Ill.; and vice president, Albert L. Hunt, executive vice president, Superior Foundry Inc., Cleveland.

Nominated to serve as national directors for three years are Robert R. Ashley, foundry manager, Detroit Controls Div., American Radiator & Standard Sanitary Corp., Bridgeport, Conn.; Donald E. Webster, foundry superintendent, American Laundry Machinery Co., Rochester, N. Y.; Walter E. Sicha, chief, Cleveland Research Div., Aluminum Co. of America, Cleveland; James T. Moore, vice president, Wells Mfg. Co., Skokie, Ill.; Warren C. Jeffrey, product development manager, McWane Cast Iron Pipe Co., Birmingham; Arthur F. Falk, general manager, Centrifugal Casting Co., Long Beach, Calif.; and Thomas T. Lloyd, vice president of manufacturing, Albion Malleable Iron Co., Albion, Mich.

Committees—Philadelphia Chapter of AFS will be host chapter for the convention, and Clyde B. Jenni, General Steel Castings Corp., Eddystone, Pa., is general convention chairman. Henry C. Winte, Florence Pipe Foundry & Machine Co., Florence, N. J., is general convention vice chairman, and Herman E. Mandel, Pennsylvania Foundry Supply & Sand Co., Philadelphia, is secretary-treasurer.

Chapter Convention Committee Officers

CLYDE B. JENNI
General Chairman

HENRY C. WINTE
Vice Chairman

HERMAN E. MANDEL
Secretary-Treasurer

Other committee chairmen include the following: Plant Visitation—Charles W. Mooney, Olney Foundry Div., Link-Belt Co., Philadelphia; Banquet—William J. Gallana, E. J. Lavino & Co., Philadelphia; Shop Course—Robert F. Schmidt, Ajax Metal Div., H. Kramer & Co., Philadelphia; Philadelphia Day—Edward C. Klank, Philadelphia Coke Co., Philadelphia; Ladies Entertainment—Robert C. Stokes, Crown Non-Ferrous Foundry Inc., Chester, Pa.; Reception—John M. Robb, Pennsylvania Foundry Supply & Sand Co.

Annual Banquet — AFS Gold Medal Awards will be presented Wednesday night at the annual banquet in the ballroom of the Sheraton Hotel.

Principal speaker at the banquet will be Dr. Bergen Evans, professor of English at Northwestern University, Evanston, Ill., and well known author and television moderator. His subject will be "Where Do We Go with Brains."

International Reception — To honor visitors from more than 20 foreign countries, an International Reception has been planned for Monday evening, May 9, at the Sheraton Hotel. An official welcome will be extended to the foreign contingent at that time. These visitors include foundrymen from Australia, India, Japan, England, Finland, Germany, Sweden, Switzerland, Italy, Holland, Russia, Mexico, and several Central and South American countries. In addition, manufacturers from England, Belgium, Holland, Switzerland, and Germany will display developments in foreign products for foundry use.

DR. BERGEN EVANS
Banquet Speaker

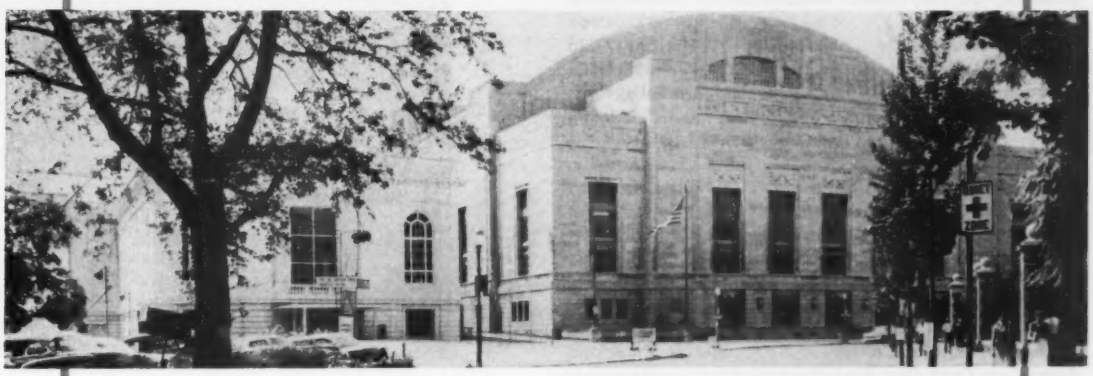
Plant Visitations—More than a dozen plants in the Philadelphia area will welcome visitors at various times during the convention. A list of these plants appears elsewhere on these pages and includes complete details concerning types of castings produced, visiting days, and hours during which plants will be open.

Ladies' Entertainment—The ladies entertainment program has been arranged by a committee having Mrs. Robert C. Stokes and Mrs. E. A. Zeeb as co-chairmen. Committee members include Mrs. Clyde B. Jenni, Mrs. Herman E. Mandel, Mrs. Charles W. Mooney, Mrs. Robert F. Schmidt, and Mrs. Edward C. Klank. The program includes the official AFS tea on Monday, a luncheon and style show on Tuesday, opportunity to visit places of historical interest on Wednesday, and a bus trip to Longwood Gardens, Wilmington, Del., on Thursday. Registration headquarters for ladies will be at the Pink Room of the Bellevue-Stratford.

Philadelphia Day — Friday, May 13, has been designated Philadelphia Day. On that date, employees of local foundries will be admitted by free tickets distributed by Philadelphia Chapter, AFS.

Plants Open for Inspection During AFS Congress

COMPANY	LOCATION	TYPES OF WORK	VISITING TIMES
Alan Wood Steel Co.	Conshohocken, Pa.	Coke plant and blast furnace	May 12, 9 a.m.
Alloy Steel Casting Co.	Southampton, Pa.	Stainless steel, Monel, Hastelloy, and other types of sand castings	May 9-13, after 1 p.m.
Atlantic Steel Castings Co.	Chester, Pa.	Electric steel jobbing foundry, medium castings	May 9-13, 9 a.m. to Noon and 1 to 3:45 p.m.
Birdsboro Corp.	Birdsboro, Pa.	Heavy steel castings	May 9-13, 9 a.m.
Eastern Malleable Iron Co.	Wilmington, Del.	Malleable iron castings and converter steel	May 10, 12, and 13 10 a.m.
H. G. Enderlein Co.	Philadelphia	Gray iron castings	May 9 to 12, 9 a.m. to closing
Florence Pipe Foundry & Machine Co.	Florence, N. J.	Centrifugally cast pipe and rolls, fittings, and jobbing gray iron	May 12
Lehigh Foundries Co.	Easton, Pa.	Malleable iron	May 9-13, any time
Olney Foundry, Link-Belt Co.	Philadelphia	Gray iron	May 10, 12, and 13 9:30 a.m. and 1 p.m.
Northern Bronze Corp.	Philadelphia	Nonferrous	May 9-13, between 8 a.m. and 4:30 p.m.
Philadelphia Coke Div., Eastern Gas & Fuel Assoc.	Philadelphia	Coke and coal chemicals	May 9-13, 9 a.m. to 4 p.m.
Textile Machine Works, Foundry Div.	Reading, Pa.	Gray iron, ductile iron, semisteel, bronze, and aluminum	May 9-13, 9 a.m. to 3 p.m.
United States Pipe & Foundry Co.	Burlington, N. J.	Centrifugal casting of iron pressure pipe 4 to 24 in. in diam	May 10 and 12 (avoid noon hour)
Weisbach Corp.	Philadelphia	Nonferrous foundry and machine shop producing brass plumbing supplies	May 10 and 12, 9:30 a.m.
Wilkening Mfg. Co.	Philadelphia	High production stack molding of piston rings	May 9, 10, and 12 9:30 a.m. to Noon
Williamstown Foundry Corp.	Williamstown, N. J.	Cast iron soil pipe and fittings, bench and floor molds	May 9-13, 9 a.m. to 2 p.m.



AFS FOUNDRY EXPOSITION

● OPERATING EXHIBITS will feature the AFS Foundry Exposition at Philadelphia's Convention Hall, May 9-13. In addition to working demonstrations by individual exhibitors, 12 companies will sponsor four joint exhibits.

These co-operative displays will include such operations as sand preparation, molding, shell molding and coremaking, melting, pouring, shakeout, and finishing. Steps in the actual production of castings will be demonstrated at the exhibit of Murrell Dobbins Vocational-Technical School of Philadelphia, a project sponsored by the school and the Philadelphia AFS Chapter.

A variety of new and improved equipment and supplies will be found in the more than 200 booths of exhibitors, at least five of which are European firms.

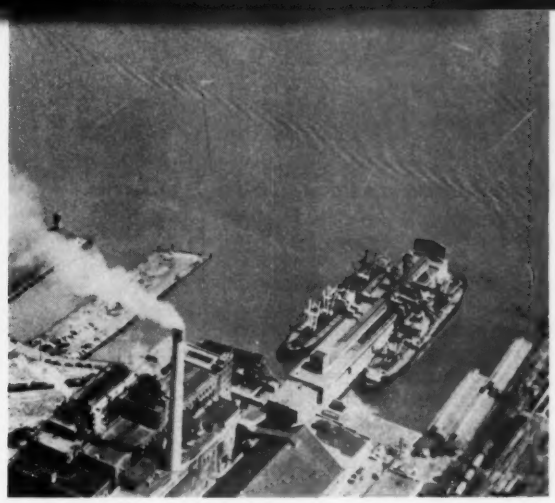
The Exposition opens at 9 a.m. each morning except Wednesday, when the starting time is 11 a.m. Closing is 5:30 p.m. Monday through Thursday and 5 p.m. on Friday. On Friday, Philadelphia Day, employees of local foundries will be admitted by free tickets distributed by the Philadelphia Chapter.

List of Exhibitors

(Corrected as of April 13)

Acme Resin Corp. . . . . Forest Park, Ill.
Adams Co. . . . . Dubuque, Iowa
A. I. C. Engineering Co. . . . . Indianapolis
Air Reduction Co., Pure Carbonic Co. Div. . . . . New York
Ajax Magnethermic Corp. . . . . Youngstown
Ajax Metal Div., H. Kramer & Co. . . . . Philadelphia
Alan Wood Steel Co. . . . . Conshohocken, Pa.
Allied Chemical Corp., Semet Solvay Div. . . . . New York
Alloy Metal Abrasive Co. . . . . Ann Arbor, Mich.
Alphaco Inc. . . . . York, Pa.
Alpha-Lux Co. Inc. . . . . New York
Aluminium Ltd. Sales Inc., Apex Smelting Co. . . . . Chicago
American Air Filter Co. . . . . Louisville, Ky.
American Colloid Co. . . . . Skokie, Ill.
American Foundry Flask Co. . . . . Kansas City, Mo.
American Marietta Co., Hydro-Blast Div., Guardite Co. . . . . Wheeling, Ill.
American Marietta Co., Presstite Div. . . . . St. Louis
American Metal Market . . . . . New York
American Refractories & Crucible Corp. . . . . North Haven, Conn.
American Smelting & Refining Co., Federated Metals Div. . . . . New York
Apex Smelting Co., Aluminium Ltd. Sales Inc. . . . . Chicago
Arcair Co. . . . . Lancaster, Ohio
Archer-Daniels-Midland Co. . . . . Cleveland
Atlas Copco Eastern Inc. . . . . New York
Aurora Metal Co., Faskure Div. . . . . Aurora, Ill.
Automation . . . . . Cleveland
Baird-Atomic Inc. . . . . Cambridge, Mass.
Balsam Gap Co. Div., E. J. Lavino & Co. . . . Philadelphia
Baroid Chemicals Inc., Div. National Lead Co. . . Houston
C. O. Bartlett & Snow Co. . . . . Cleveland
Basic Products Corp., Hevi-Duty Electric Co. Div. . . . . Milwaukee
Basic Products Corp., Como-Cast Corp. Div. . . Milwaukee
Beardsley & Piper Div., Pettibone Mulliken Corp. . . . . Chicago
Bekaert Steel Wire Corp. . . . . New York
Beryllium Corp. . . . . Reading, Pa.
Bigelow-Garvey Lumber Co. . . . . Chicago
Blastcrete Service Co. . . . . Los Angeles
Blaw-Knox Co. . . . . Pittsburgh
British Industries Corp., Shaw Process Development Corp. Div. . . . . Port Washington, N. Y.
British Moulding Machine Co. Ltd. . . . . Faversham, Kent, England
Brown Metals Inc. . . . . Elyria, Ohio

Brush Beryllium Co. ..... Cleveland
Budd Co., Carbonyl Metal Products Div. ... Philadelphia
C & S Products Co. ..... Detroit
Campbell-Hausfeld Co. ..... Harrison, Ohio
Carbonyl Metal Products Div., Budd Co. ... Philadelphia
Carborundum Co. ..... Niagara Falls, N. Y.
Cardox Div., Chemetron Corp. ..... Chicago
Carrier Conveyor Corp. Div., Chain Belt Co. ..... Louisville, Ky.
Carver Foundry Products Co. ..... Muscatine, Iowa
Centrifugal Casting Machine Co. ..... Tulsa, Okla.
Chain Belt Co., Carrier Conveyor Div. .... Louisville, Ky.
Chemetron Corp., Cardox Div. ..... Chicago
Clearfield Machine Co. ..... Clearfield, Pa.
Cleveland Flux Co. ..... Cleveland
Cleveland Metal Abrasive Co. ..... Cleveland
Cleveland Vibrator Co. ..... Cleveland
Como-Cast Corp. Div., Basic Products Corp. .. Milwaukee
Connecticut Coke Co., Eastern Gas & Fuel Associates, ... New Haven, Conn.
Cooper-Chapman Ltd. ..... Toronto, Canada
Corn Products Sales Co. ..... New York
Davenport Machine & Foundry Co. .... Davenport, Iowa
Davey Compressor Co. ..... Kent, Ohio
Davis Fire Brick Co. ..... Oak Hill, Ohio
Dayton Oil Co. ..... Dayton, Ohio
Debevoise-Anderson Co. ..... New York
Delta Oil Products Corp. ..... Milwaukee
Demmler Mfg. Co. ..... Kewanee, Ill.
Dependable Shell Core Machines Inc. .. Portland, Oreg.
Detroit Electric Furnace Div., Kuhlman Electric Co. ..... Bay City, Mich.
Deynor Corp. ..... Mamaroneck, N. Y.
Harry W. Dietert Co. ..... Detroit
Dike-O-Seal Inc. ..... Chicago
Joseph Dixon Crucible Co. ..... Jersey City, N. J.
Durez Plastics Div., Hooker Chemical Corp. ..... North Tonawanda, N. Y.
Eastern Clay Products Div., International Minerals & Chemical Corp. ..... Skokie, Ill.
Eastern Gas & Fuel Associates .. Boston, New Haven, Conn., Philadelphia
Electro Refractories & Abrasives Corp. ..... Lackawanna, N. Y.
Electrode Div., Great Lakes Carbon Corp. .... New York
Encyclopaedia Britannica Inc. ..... Philadelphia
Exomet Inc. ..... Conneaut, Ohio
Fanner Mfg. Co. ..... Cleveland
Faskure Div., Aurora Metal Co. ..... Aurora, Ill.
F. E. (North America) Ltd. ..... Toronto, Ont., Canada
Federated Metals Div., American Smelting & Refining Co. ..... New York
Fendall Co. ..... Chicago
FOUNDRY ..... Cleveland
Foundry Equipment Co. ..... Cleveland
Foundry Services Inc. ..... Cleveland
Fox Grinders Inc. ..... Pittsburgh
Freeman Supply Co. ..... Toledo, Ohio
Fremont Flask Co. ..... Fremont, Ohio
Furane Plastics Inc. ..... Los Angeles
General Dynamics Corp., Liquid Carbonic Div. ..... Chicago
General Refractories Co. ..... Philadelphia
Daniel Goff Co. ..... Mauricetown, N. J.
Great Lakes Carbon Corp., Electrode Div. ..... New York
Great Lakes Foundry Sand Co. ..... Detroit
Guardite Co., Hydro-Blast Div., American Marietta Co. ..... Wheeling, Ill.
Hansberg Shooters Inc. ..... Evanston, Ill.
Harbison-Walker Refractories Co. ..... Pittsburgh
Harnischfeger Corp. ..... Milwaukee
Benj. Harris & Co. ..... Chicago Heights, Ill.
Harrison Machine Co. ..... Wesleyville, Erie, Pa.
Hartley Controls Corp. ..... Neenah, Wis.
Herman Pneumatic Machine Co. ..... Pittsburgh
Hevi-Duty Electric Co., Div. Basic Products Corp. ..... Milwaukee
Hewitt-Robins Inc. ..... Stamford, Conn.
Hickman, Williams & Co. ..... Philadelphia
Hill & Griffith Co. ..... Cleveland
Hines Flask Co. ..... Cleveland
Hooker Chemical Corp., Durez Plastics Div. ..... North Tonawanda, N. Y.
Frank G. Hough Co. ..... Libertyville, Ill.
Hydro-Blast Div., Guardite Co., American Marietta Co. ..... Wheeling, Ill.
Hysol Corp. ..... Olean, N. Y.
Illinois Clay Products Co. ..... Chicago
Indiana General Corp., Stearns Magnetic Products Div. ..... Milwaukee
Indianapolis Wire Bound Box Co. ..... Fernwood, Miss.
Inductotherm Corp. ..... Delanco, N. J.
International Automation Corp. ..... Ann Arbor, Mich.
International Foundry Supply Co. ..... Reading, Pa.
International Graphite & Electrode Div., Speer Carbon Co. ..... St. Marys, Pa.
International Minerals & Chemical Corp. .... Skokie, Ill.
International Molding Machine Co. .. LaGrange Park, Ill.
International Nickel Co. Inc. ..... New York
Iron Lung Ventilator Co. ..... Cleveland
Jeffrey Mfg. Co. ..... Columbus, Ohio
Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemicals Corp. ..... Oakland, Calif.
Keokuk Electro-Metals Co., Div. Vanadium Corp. of America ..... Keokuk, Iowa
Kindt-Collins Co. ..... Cleveland
King Tester Corp. ..... Philadelphia
Lester B. Knight & Associates Inc. ..... Chicago
H. Kramer & Co. ..... Chicago
Kuhlman Electric Co., Detroit Electric Furnace Div. ..... Bay City, Mich.
Laboratory Equipment Corp. ..... St. Joseph, Mich.
Latrobe Steel Co. ..... Latrobe, Pa.
Lava Crucible Refractories Co. ..... Pittsburgh
R. Lavin & Sons Inc. ..... Chicago
E. J. Lavino & Co., Balsam Gap Co. Div. ... Philadelphia
Lindberg Engineering Co. ..... Chicago
Link-Belt Co. ..... Chicago
Liquid Carbonic Div., General Dynamics Corp. .. Chicago
Machine Design ..... Cleveland
Magnaflux Corp. ..... Chicago
Magnet Cove Barium Corp. .... Arlington Heights, Ill.



Part of the Port of Philadelphia

Main Brothers Box & Lumber Co. . . . . Karnak, Ill.
Manganese Steel Forge Co. . . . . Philadelphia
Manley Sand Co. . . . . Rockton, Ill.
Martin Engineering Co. . . . . Neponset, Ill.
Massey-Ferguson Inc., Industrial Div. . . . . Wichita, Kans.
Master Power Corp. . . . . Bedford, Ohio
Metallizing Co. of America Inc. . . . . Chicago
Metallurgical Products Co. . . . . Philadelphia
Mexico Refractories, Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp. . . . . Oakland, Calif.
Milwaukee Chaplet & Mfg. Co. . . . . Milwaukee
Minerals & Chemicals Corp. of America . . . . . Menlo Park, N. J.
Mine Safety Appliances Co. . . . . Pittsburgh
Modern Equipment Co. . . . . Port Washington, Wis.
Jesse S. Morie & Son Inc. . . . . Mauricetown, N. J.
Moulders' Friend . . . . . Dallas City, Ill.
Murrell Dobbins Vocational Technical School . . . . . Philadelphia
Nassau Smelting & Refining Co. . . Tottenville, S. I., N. Y.
National Acme Co., Shalco Div. . . . . Cleveland
National Carbon Co. Div., Union Carbide Corp. . . . . New York
National Crucible Co. . . . . Philadelphia
National Engineering Co. . . . . Chicago
National Glass Sand Corp. . . . . Millville, N. J.
National Lead Co., Baroid Chemicals Inc. Div. . . . . Houston
National Metal Abrasive Co. . . . . Cleveland
National Pigment Co. . . . . Philadelphia
Newaygo Engineering Co. . . . . Newaygo, Mich.
New England Coke Co., Eastern Gas & Fuel Associates . . . . . Boston
New Equipment Digest . . . . . Cleveland
New Jersey Silica Sand Co. . . . . Millville, N. J.
Nomad Equipment Corp. . . . . Milwaukee
Northwest Olivine Co. . . . . Seattle
North American Smelting Co. . . . . Wilmington, Del.
S. Obermayer Co. . . . . Chicago
Ohio Electric Mfg. Co. . . . . Maple Heights, Ohio
Ohio Ferro-Alloys Corp. . . . . Canton, Ohio
Olin Mathieson Chemical Corp. . . . . New York
Oliver Machinery Co. . . . . Grand Rapids, Mich.
Orefraction Minerals Inc. . . . . Andrews, S. C.
Osborn Mfg. Co. . . . . Cleveland
Pangborn Corp. . . . . Hagerstown, Md.
Pekay Machine & Engineering Co. . . . . Chicago
Albert W. Pendergast Safety Equipment Co. . . . . Philadelphia
Penn-Rillton Co. . . . . New York
Pennsylvania Foundry Supply & Sand Co. . . Philadelphia
Pennsylvania Glass Sand Corp. . . . . New York
Penola Oil Co. . . . . Detroit
Pettibone Mulliken Corp., Beardsley & Piper Div. . . . . Chicago
George F. Pettinos Inc. . . . . Philadelphia
Philadelphia Coke Div., Eastern Gas & Fuel Associates . . . . . Philadelphia
Picker X-Ray Corp. . . . . White Plains, N. Y.
Pittsburgh Crushed Steel Co. . . . . Pittsburgh
Planet Corp. . . . . Lansing, Mich.
Presstite Div., American Marietta Co. . . . . St. Louis
Pressure Match Plate Co. . . . . Philadelphia
Punch-Lok Co. . . . . Chicago
Pure Carbonic Co. Div., Air Reduction Co. . . . . New York
Pyrometer Instrument Co. . . . . Bergenfield, N. J.
Redford Iron & Equipment Co. . . . . Detroit
Roessing Bronze Co. . . . . Pittsburgh
Ross-Tacony Crucible Co. . . . . Philadelphia
Royer Foundry & Machine Co. . . . . Kingston, Pa.
Safety First Shoe Co. . . . . Holliston, Mass.
George Sall Metals Co. . . . . Philadelphia
Claude B. Schneible Co. . . . . Detroit
Schramm Inc. . . . . West Chester, Pa.
Scientific Cast Products Corp. . . . . Cleveland
Security Alloys Co. . . . . Chicago
Semet Solvay Div., Allied Chemical Corp. . . . . New York
Servo-Lift . . . . . Chicago
Shalco Div., National Acme Co. . . . . Cleveland
Shaw Process Development Corp., Div. British Industries Corp. . . . . Port Washington, N. Y.
Shell Process Inc. . . . . West Springfield, Mass.
Simplicity Engineering Co. . . . . Durand, Mich.
Sipi Metals Corp. . . . . Chicago
G. E. Smith, Inc. . . . . Pittsburgh
Smith & Richardson Mfg. Co. . . . . Geneva, Ill.
Speer Carbon Co., International Graphite & Electrode Div. . . . . St. Marys, Pa.
Spo Inc. . . . . Cleveland
Stahl Specialty Co. . . . . Kingsville, Mo.
Standard Electrical Tool Co. . . . . Cincinnati
Standard Horse Nail Corp. . . . . New Brighton, Pa.
Stearns Magnetic Products Div., Indiana General Corp. . . . . Milwaukee
Steel . . . . . Cleveland
Sterling National Industries Inc. . . . . Milwaukee
Frederic B. Stevens Inc. . . . . Detroit
F. J. Stokes Corp. . . . . Philadelphia
Sutter Products Co. . . . . Holly, Mich.
Tabor Mfg. Co. Div., Turbo Machine Co. . . Lansdale, Pa.
Taccone Corp. . . . . North East, Pa.
Taggart Brimfield Co. . . . . Hammonton, N. J.
Thor Power Tool Co. . . . . Aurora, Ill.
Toledo Scale Div., Toledo Scale Corp. . . . . Toledo, Ohio
Turbo Machine Co., Tabor Mfg. Co. Div. . . Lansdale, Pa.
Union Carbide Metals Co., Div. Union Carbide Corp. . . . . New York
United Oil Mfg. Co. . . . . Erie, Pa.
United States Gypsum Co. . . . . Chicago
Valvair Corp. . . . . Akron
Vanadium Corp. of America . . . . . New York
Vesuvius Crucible Co. . . . . Pittsburgh
Walker Peenimpac Machine Mfg. Div., Walker Pump Co. . . . . Brooklyn, N. Y.
Westinghouse Electric Corp., X-Ray Dept. . . . . Baltimore
Wheelabrator Corp. . . . . Mishawaka, Ind.
Whirl-Air-Flow Corp. . . . . Minneapolis
Whitehead Brothers Co. . . . . New York
Wolverine Foundry Supply Co. . . . . Detroit
Yale & Towne Mfg. Co. . . . . Philadelphia

TECHNICAL PROGRAM • AFS Congress

MONDAY, MAY 9

8:30 a.m.—Registration opens (to 5:30 p.m.)

9 a.m.—Exhibits open

9 a.m.—Ladies' registration opens (to 3 p.m.)

9:30 a.m.—Brass and Bronze Session

Formation of Dispersions in Molten Copper by Mechanical Mixing—D. N. Williams, J. W. Roberts, R. I. Jaffee, Battelle Memorial Institute, Columbus, Ohio.

Fluidity of 85-5-5-5 *and Composition "M" Metal*—R. A. Rosenberg, H. D. Bordy, F. C. Monkman Jr., Walworth Co., South Braintree, Mass.

Brass and Bronze Research Progress Report—sponsored by AFS Training and Research Institute—R. A. Flinn, University of Michigan, Ann Arbor.

9:30 a.m.—Light Metals Session

Inclusion Identification in Magnesium Alloy Castings—B. Lagowski, W. A. Pollard, Department of Mines and Technical Surveys, Ottawa, Ont., Canada.

Casting of Ordnance Type Titanium Parts—H. McCurdy, Battelle Memorial Institute, Columbus, Ohio, and H. Antes, R. E. Edelman, Frankfort Arsenal, Philadelphia.

Factors Contributing to the Soundness of Titanium Castings—J. W. Smith, T. A. Hamm, Oregon Metallurgical Corp., Albany, Oreg.

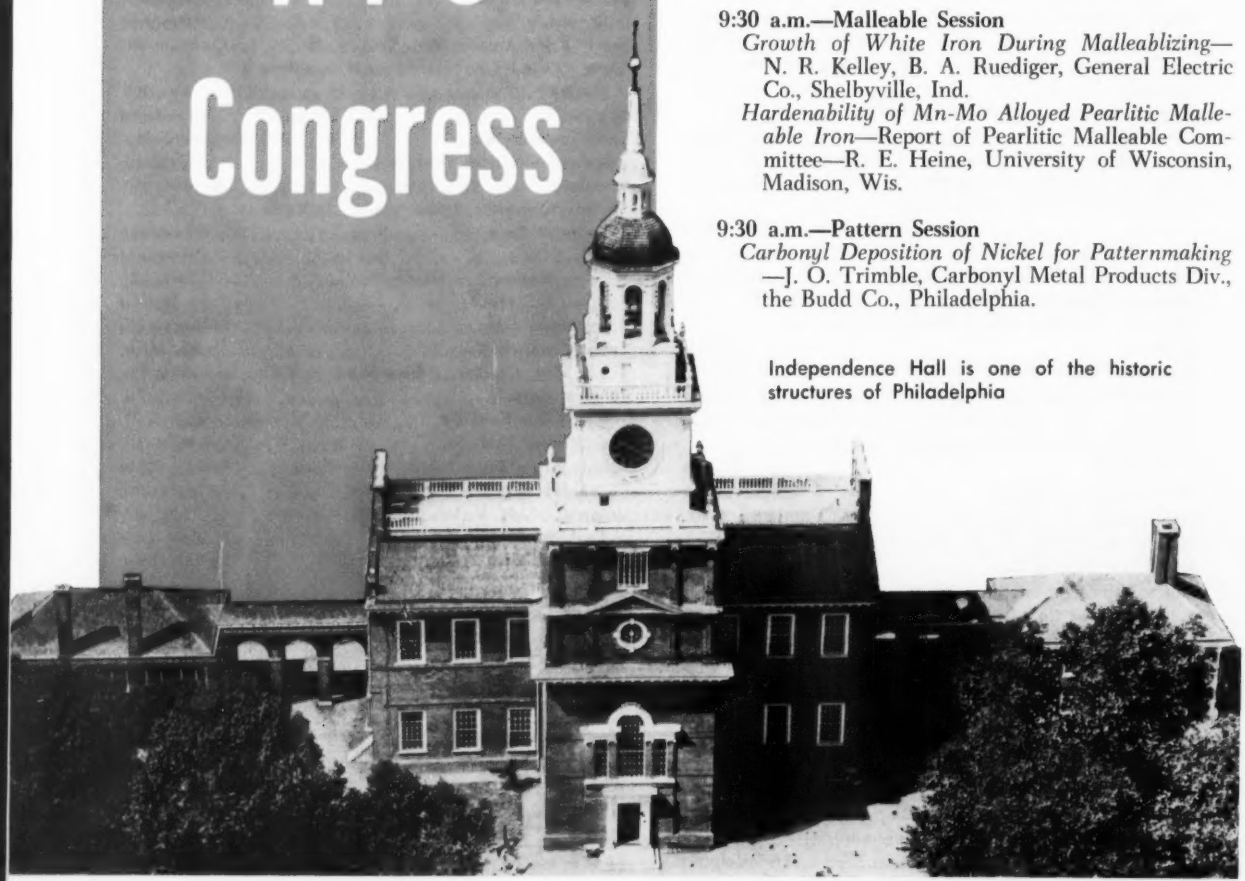
9:30 a.m.—Malleable Session

Growth of White Iron During Malleablizing—N. R. Kelley, B. A. Ruediger, General Electric Co., Shelbyville, Ind.

Hardenability of Mn-Mo Alloyed Pearlitic Malleable Iron—Report of Pearlitic Malleable Committee—R. E. Heine, University of Wisconsin, Madison, Wis.

9:30 a.m.—Pattern Session

Carbonyl Deposition of Nickel for Patternmaking—J. O. Trimble, Carbonyl Metal Products Div., the Budd Co., Philadelphia.



Independence Hall is one of the historic structures of Philadelphia

Electroforming for Pattern Construction and Repair—P. J. Ritzenthaler, Plating Engineering Corp., Milwaukee.

12 noon—Malleable Roundtable Luncheon

Are We Measuring Up?—Hans J. Heine, Malleable Founders Society, Cleveland.

2 p.m.—Brass and Bronze Session

The Effect of Section Thickness, Gas Content and Directional Solidification on Mechanical Properties of Eight Copper-Base Casting Alloys—J. O. Edwards, D. A. Whittaker, Department of Mines and Technical Surveys, Ottawa, Ont., Canada.

Inherent Characteristics of 70/30 Cupro-Nickel—B. F. Shepherd, Ingersoll-Rand Co., Phillipsburg, N. J.

2 p.m.—Pattern Session

New Materials for Wood Patternmaking—R. LeMaster, Nelson Pattern Co., Milwaukee.

The Shaw Process for Patternmaking—I. Lubalin, Shaw Process Development Corp., Port Washington, N. Y., and R. J. Christensen, Wisconsin Pattern Works Inc., Racine, Wis.

4 p.m.—Brass and Bronze Seminar

Salvage and Repair of Copper-Base Alloy Castings. Impregnation—C. Behen, Metallizing Co. of America, Chicago; Weld Repair of Aluminum and Manganese Bronzes—E. Garriott, Ampco Metal, Inc., Milwaukee; Weld Repair of Tin Bronzes—J. Mikulak, Worthington Corp., Harrision, N. J.

4 p.m.—Sand Session

Parashrinkage Phenomena—Veining, Metal Penetration, Scabbing, Hot Tearing—D. C. Williams, Ohio State University, Columbus, Ohio.

Study of Surface Area Measurements and Theoretical and Experimental Relation to Angularity and Shape Factors in Foundry Sands—G. J. Vingas, A. H. Zrimsek, Magnet Cove Barium Corp., Arlington Heights, Ill.

Canadian Nonferrous and Iron Foundry Sand Practice Survey—Report Committee 8-Y—A. E. Murton, Department of Mines and Technical Surveys, Ottawa, Ont., Canada.

8 p.m.—Sand Shop Course

New Horizons in Sand Practice. Green Sand—C. M. Eberhardt, Central Foundry Div., General Motors Corp., Danville, Ill.; Air Setting Binders—D. N. Rosenblatt, American Foundry & Machine Co., Salt Lake City; Shell Molds—W. C. Capehart, Monsanto Chemical Co., Springfield, Mass.

8 p.m.—Malleable Shop Course

Demonstration Showing Various Elements Accounting for Casting Failure—C. R. Baker, Albion Malleable Iron Co., Albion, Mich.

Demonstration Showing Casting Replacing Poorly Designed Stamping—J. L. Flitz, Central Foundry Div., General Motors Corp., Saginaw, Mich.

Need for Direct Communication between Foundrymen and Designer—H. J. Heine, Malleable Founders Society, Cleveland.

Discussion of Design Engineers' Terms—J. B. Caine, Cincinnati.

How Lacquer Coatings are Used for Stress Analysis—R. A. Johns, Belle City Malleable Iron Co., Racine, Wis.

Scrap Reduction through Better Design—J. W. Beckham, Texas Foundries Inc., Lufkin, Tex.

Motion Picture Film—*The Big Difference.*

Summation of the Shop Course—R. J. Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

TUESDAY, MAY 10

8:30 a.m.—Registration opens (to 5:30 p.m.)

9 a.m.—Exhibits open

9 a.m.—Ladies' registration opens

9:30 a.m.—Brass and Bronze Session

Shell Molded Test Bars for Tin Bronze Casting Alloys—S. Goldspiel, E. W. Chrzan, M. L. Foster, New York Naval Shipyard, Brooklyn, N. Y.

A New Method for Degassing Copper-Base Foundry Alloys—R. J. Cooksey, R. W. Ruddle, Foundry Services Inc., Cleveland.

Casting Characteristics of a Mn-Ni-Al Bronze for Propellers—G. H. Bradshaw, M. M. Kennedy, S. H. Dorn, Philadelphia Naval Shipyard, Philadelphia.

9:30 a.m.—Malleable Session

Effect of Additions to the Melt on Mottling Tendency in Heavy Sections—Second Progress Report on Investigation of Casting Heavy Section Malleable Iron sponsored by the Malleable Division, Part I—C. R. Loper Jr., R. W. Heine, University of Wisconsin, Madison, Wis.

Effects of Additions to the Melt on Annealability of White Iron—Second Progress Report on an Investigation of Casting Heavy Section Malleable Iron sponsored by the Malleable Division, Part II—C. R. Loper Jr., R. W. Heine, J. Waring, University of Wisconsin, Madison, Wis.

9:30 a.m.—Pattern Session

Pattern and Core Box Equipment for Blowing Foundry Sands, Venting and Design—Z. Madacey, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago.

Plastic Patterns New Tools and Equipment—F. Kobee, Ohio Metal Fibers, Toledo, Ohio.

9:30 a.m.—Safety, Hygiene and Air Pollution Session

Dust Collector Review—D. G. Stephan, U. S. Department of Health, Education and Welfare, Cincinnati.

Loss Prevention Through Accident Prevention in the Foundry—G. A. Riley, American Brake Shoe Co., New York.

Motion picture—*It's Up to You.*

An Eye for an Eye—J. E. O'Neil, National Society for the Prevention of Blindness, New York.

12 noon—Brass and Bronze Round-Table Luncheon

What's Ahead for the Copper-Base Alloy Foundry Industry—N. A. Birch, National Bearing Div., American Brake Shoe Co., St. Louis.

12 noon—Pattern Roundtable Luncheon

Marketing Your Product—S. C. Massari, American Foundrymen's Society, Des Plaines, Ill.

2 p.m.—Education Session

An Evaluation of Various Methods of Fabrication—J. G. Frantzreb, Caterpillar Tractor Co., Peoria, Ill.

2 p.m.—Gray Iron Session

Microstructural Changes upon Tempering of Nickel Chromium White Iron at 400° F—J. R. Mihalisin, R. D. Schelleng, International Nickel Co., Bayonne, N. J.

Gray Cast Iron Charpy Impact Test and Impact Modulus—Albert De Sy, University of Ghent, Ghent, Belgium.

2 p.m.—Industrial Engineering and Cost Session

Controlling Costs of Foundry Operations—K. T. Rinderle, Farrell-Cheek Steel Co., Sandusky, Ohio.

Job Evaluation—Asset or Liability—A. G. McNichol, Canada Iron Foundries Ltd., Toronto, Ont., Canada.

2 p.m.—Steel Session

Oxygen-Gas Burner Use for Scrap Meltdown in the Small Arc Furnace—V. J. Howard, Oklahoma Steel Castings Co., Tulsa, Okla.

Alloy 20 Stainless Steel Production and Mechanical Properties—L. Fink, Electric Steel Foundry Co., Portland, Oreg.

2 p.m.—Light Metals Session

Short Time Elevated Temperature Properties of Premium Quality Magnesium Castings—W. Gronvold, Boeing Airplane Co., Seattle.

Thermal Requirements for Porosity-Free Magnesium Alloy Castings—R. D. Green, Dow Chemical Co., Midland, Mich.

Techniques for Producing Premium Quality Magnesium Castings for Missile Applications—M. C. Flemings, E. J. Poirier, H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

4 p.m.—Gray Iron Session

Progress Report—Gray Iron Research, Feeding Distance of Risers for Gray Iron Castings—G. K. Turnbull, H. D. Merchant, J. F. Wallace, Case Institute of Technology, Cleveland.

Operating Experience with a Liningless, Water-Cooled Cupola—M. E. Rollman, D. J. Pusack, Cincinnati Milling Machine Co., Cincinnati.

4 p.m.—Light Metals Session

Effect of Casting Temperature on Aluminum Alloy Test Bar Properties—J. W. Meier, A. Couture, Department of Mines and Technical Surveys, Ottawa, Ont., Canada.

Approach to Rigging Aluminum—7% Magnesium Castings—J. G. Kura, W. A. Johnson, Battelle Memorial Institute, Columbus, Ohio.

Developments in Magnesium Practice—J. G. House, Dow Metal Products Co., Div. the Dow Chemical Co., Midland, Mich.

4 p.m.—Malleable Session

Malleable Straightening Dies. Hot Straightening of Transmission Ring, Transmission Part, R. E. Elsea, Central Foundry Div., General Motors Corp., Saginaw, Mich.

Hay Conditioner, Case Die, Twine Needle—L. E. Sutton, John Deere Malleable Iron Works, East Moline, Ill.; Transmission Fork, Bearing Cap, Crankshaft—W. L. Olsen Jr., Wagner Castings Co., Decatur, Ill.; Differential Case Die, Carrier Die, Spring Hanger—N. Zitta, Auto Specialties Mfg. Co., St. Joseph, Mich.; 300-Pound Side Cover, Chrysler Torsion Bar—O. K. Hunsaker, Dayton Malleable Iron Co., Dayton, Ohio.

Penn Center is a striking new addition to the downtown area of Philadelphia

4 p.m.—Sand Session

Apparent Thermal Conductivity of Molding Sand at Elevated Temperatures—D. H. Witmore, Q. F. Ingerson, Northwestern University, Evanston, Ill.

Molding Sand Control by Green Compressive and Green Shear Strengths Testing—R. W. Heine, University of Wisconsin, Madison, and J. S. Schumacher, E. H. King, Hill & Griffith Co., Cincinnati.

Sampling of Sand—Report of Grading, Fineness and Distribution Committee.

7 p.m.—Canadian Dinner
Presiding—A. J. Moore, Canadian Bronze Co. Ltd., Montreal, Quebec, Canada.

7 p.m.—Sand Dinner
Foundry Production in the U.S.S.R.—Ylian A. Nekhendzi, head of Chair of Foundry Production, Leningrad Polytechnic Institute, Leningrad, U.S.S.R.

8 p.m.—Gray Iron Shop Course
Fundamental Behavior of Gray Iron—H. L. Womochel, Michigan State University, East Lansing, Mich.

8 p.m.—Malleable Shop Course
Melting Materials and Procedures—Silvery Pig Iron vs. Ferrosilicon, and Ferromanganese vs. Spiegel—H. T. Sheppard, Belle City Malleable Iron Co., Racine, Wis.; Typical Cold Charge and Charge Cost—J. W. Clarke, General Electric Co., Erie, Pa.; Malleable Pig vs. Steel Scrap—C. M. Eberhardt, Central Foundry Div., General Motors Corp.; Hot Blast vs. Cold Blast—N. Lillybeck, Modern Equipment Co., Port Washington, Wis.; Northern vs. Southern Coke—W. E. Jaeschke, Whiting Corp., Harvey, Ill.

WEDNESDAY, MAY 11

8:30 a.m.—Registration opens (to 5:30 p.m.)

9 a.m.—Ladies' registration opens

9:30 a.m.—AFS Annual Business Meeting
Presiding—AFS President Charles E. Nelson. President's annual address. Election of officers and directors. Apprentice contest awards. Presentation of AFS Awards of Scientific Merit. Presentation of AFS Service Citations.

10:30 a.m.—Charles Edgar Hoyt Memorial Lecture.
Where Do We Go From Here?—W. J. Grede, chairman of the board, Grede Foundries Inc., Milwaukee.

11:00 a.m.—Exhibits open.

12 noon—Management Development Luncheon
Realistic Depreciation for Foundry Equipment—Richard McNabb, Machinery and Allied Products Institute, Washington.

12 noon—Joint Light Metals and Diecasting Round-Table Luncheon.
The Aluminum Engine Block—J. Smith, Aluminum Co. of America, Cleveland, B. J. Mitchell, General Motors Corp. Technical Center, Detroit.

12 noon—Foundry Educational Foundation Trustees Luncheon. Green Room, Warwick Hotel

2 p.m.—Gray Iron Session
Heat Treatment of Cast Iron—P. H. Dirom Jr., Lynchburg Foundry Co., Lynchburg, Va.
Ladle Additions to Hypoeutectic Gray Cast Iron—D. McGrady, H. L. Womochel, Michigan State University, East Lansing, and C. L. Langenberg, Oldsmobile Div., Lansing, Mich., D. J. Harvey, Research Laboratory, General Motors Corp., Detroit.
Progress Report—Gray Iron Research—Effect of Inoculation on Risering of Gray Iron—H. D. Merchant, J. F. Wallace, Case Institute of Technology, Cleveland.

2 p.m.—Plant and Plant Equipment Session
Shell Mixing Processes and Equipment for Quality Control of Resin Coated Sand—J. Albanese, Acme Resin Co., Forest Park, Ill.

2 p.m.—Steel Session
Properties and Applications of Centrifugally Cast Steel Tubing—E. D. McCauley, American Cast Iron Pipe Co., Birmingham.
Surface Defects on Shell Molded Castings—R. W. Heine, University of Wisconsin, Madison, Wis., J. A. Behring, Vollrath Co., Sheboygan, Wis.
Management by Objective—R. W. Wilson, American Hoist & Derrick Co., St. Paul.

3 p.m.—Diecasting and Permanent Mold Session
Ultra High Pressure Casting—J. L. Reiss, E. C. Kron, Doehler-Jarvis Div., National Lead Co., Toledo, Ohio.
A Fundamental Review of Die Steels, Their Heat Treatment and Related Problems—D. R. Edgerton, N. O. Kates, Lindberg Steel Treating Co., Melrose Park, Ill.
Corrosion—Fatigue in Two Hot Work Die Steels—D. N. Williams, M. L. Kohn, R. M. Evans, R. I. Jaffee, Battelle Memorial Institute, Columbus, Ohio.
Molten Metal Handling in Diecasting Plants—V. D. Sweeney, Metal Pumping Services, Inc., Cleveland.

4 p.m.—Industrial Engineering and Cost Session
Analysis of the Incentive Questionnaire—M. T. Sell, Sterling Foundry Co., Wellington, Ohio.
Work Measurement—Pour and Shakeout—R. S. Casciari, Lebanon Steel Foundry, Lebanon, Pa.

4 p.m.—Sand Session
Effect of Ramming and Clay Content on Hot Compressive Strength of Molding Sand—R. W. Heine, W. Shaw, University of Wisconsin, Madison, and J. S. Schumacher, E. H. King, Hill & Griffith Co., Cincinnati.
The Phenolic Resin Bond in Solid Sand Cores—H. K. Salzberg, J. J. Greaves, Borden Chemical Co., Bainbridge, N. Y.

4 p.m.—Steel Session
Heat Treatment of Mn-V-Mo Age Hardenable Austenitic Steel—N. C. Howells, E. A. Lange, U. S. Naval Research Laboratory, Washington.
Impact Resistance of Nickel-Manganese Cast Steels I. B. Elman, R. D. Schelleng, International Nickel Co., Bayonne, N. J.
Effect of Homogenizing Treatments on Structure, Properties and Transformations of a High Strength, Low Alloy Cast Steel—A. M. Ayvazian, Watertown Arsenal, Watertown, Mass., M. C. Flemings, H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

5:30 p.m.—Exhibits close

7 p.m.—AFS Annual Banquet (Sheraton Hotel).
Presentation of AFS Gold Medal Awards.

Guest speaker—Dr. Bergen Evans, professor of English, Northwestern University, Evanston, Ill., author, and television moderator.

THURSDAY, MAY 12

8:30 a.m.—Registration opens (to 5:30 p.m.)

9 a.m.—Ladies' registration opens

9 a.m.—Exhibits open

9:30 a.m.—Diecasting and Permanent Mold Session

A Brief Outline of British Diecasting Practice in Aluminum Alloys—R. R. Woodward, H. J. Proffitt, High Duty Alloys Ltd., Buckinghamshire, England. (Paper sponsored by Institute of British Foundrymen.)

Low-Pressure Diecasting—E. C. Lewis, Alumase Ltd., Northamptonshire, England.

Low-Pressure Permanent Mold Casting of Aluminum—D. J. Flynn, Chevrolet Motor Div., General Motors Corp., Massena, N. Y.

9:30 a.m.—Ductile Iron Session

Symposium on Ductile Iron Quality Control Methods—G. F. Thomas, Deere & Co., Moline, Ill.; D. L. Crews, James B. Clow & Sons, Inc., Coshocton, Ohio; S. F. Levy, H. P. Deuscher Co., Hamilton, O.; H. W. Ruf, Grede Foundries Inc.

9:30 a.m.—Fundamental Papers Session

Solidification of Aluminum Casting Alloys—R. E. Spear, G. R. Gardner, Aluminum Co. of America, Cleveland.

Precision Casting Mold Materials—W. G. Lawrence, Alfred University, Alfred, N. Y.

Grain Refinement of Copper—G. C. Gould, G. W. Form, J. F. Wallace, Case Institute of Technology, Cleveland.

Hot Tearing in Nonferrous Binary Alloys—R. A. Rosenberg, M. C. Flemings, H. F. Taylor, Massachusetts Institute of Technology.

9:30 a.m.—National Castings Council, Rittenhouse Room, Warwick Hotel

9:30 a.m.—Steel Session

Stainless Steel Arc Melting Practice—S. E. Wolosin, Lebanon Steel Foundry, Lebanon, Pa.

The Economics of Quality Acid Steel Making Practice—C. F. Christopher, Blaw-Knox Co., East Chicago, Ind.

Basic Oxygen Steelmaking—Some Speculations on Steel Foundry Applications—F. E. VanVoris, Union Carbide Metals Co., Cleveland.

12 noon—Joint Gray and Ductile Iron Round-Table Luncheon

Scrap Metal for Iron Foundry Use—W. S. Story, Institute of Scrap Iron & Steel, Washington.

12 noon—Steel Round-Table Luncheon

Progress Report, steel research directed by the Steel Division Research Committee and sponsored by the AFS Training and Research Institute.

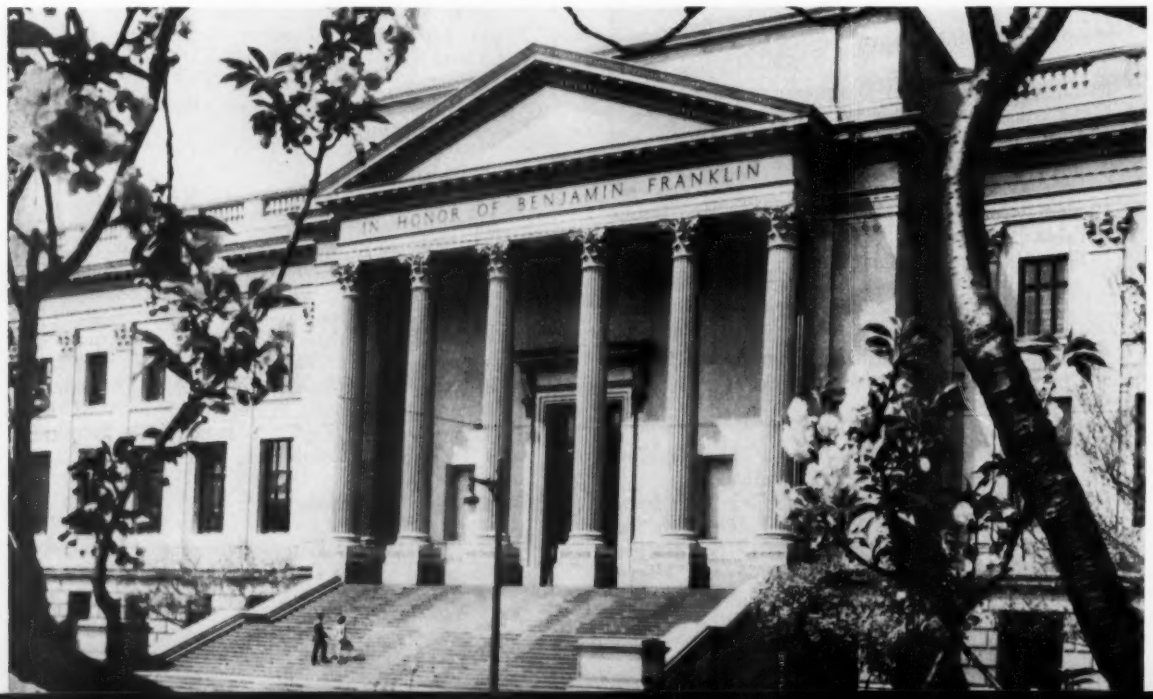
Nonmetallic Macroinclusion Causes in Steel Castings Deoxidized with Aluminum—L. H. VanVlack, R. A. Flinn, University of Michigan, Ann Arbor, Mich., G. A. Colligan, United Aircraft Corp., East Hartford, Conn.

Reactions between Refractories and Molten Steel Containing Aluminum—L. H. VanVlack, R. A. Flinn, University of Michigan, Ann Arbor, Mich.

2 p.m.—Diecasting and Permanent Mold Session

Aluminum Casting Alloys Improvement by Grain Refinement — K. Schneider, Aluminiumwerke

View of the Franklin Institute and Fels Planetarium



Nuernberg G.m.b.H., Nuernberg, Germany.
Aluminum Alloy with High Silicon Content—E. E. Stonebrook, Aluminum Co. of America, Cleveland.

2 p.m.—Ductile Iron Session
Influence of Nickel up to 37% and Silicon up to 3% on the Eutectic Carbon Content of Cast Iron—R. D. Schelleng, International Nickel Co., Bayonne, N. J.
Manufacture and Quality Control Methods for Shell Molded Nodular Iron Castings at the Ford Motor Co.—H. C. Grant, A. A. Adams, Ford Motor Co., Dearborn, Mich.

2 p.m.—Symposium on Solidification
(Jointly Sponsored by Fundamental Papers and Heat Transfer Committees.)
Solidification of Metals — General Principles — G. W. Form, J. F. Wallace, Case Institute of Technology, Cleveland.
Solidification of Steel Castings—C. W. Briggs, Steel Founders' Society of America, Cleveland.
Solidification of Cast Iron—C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala.
Solidification of Aluminum Castings—M. C. Flemings, S. Z. Uram, H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.
Solidification of Copper Alloy Castings—R. W. Ruddle, Foundry Services, Inc., Columbus, Ohio.
Solidification of Metals—A Summary—W. K. Bock, National Malleable & Steel Castings Co., Cleveland.

4 p.m.—Gray Iron Session
Hot Blast in Gray Iron Melting—W. J. Sommer, Plainville Casting Co., Plainville, Conn., D. B. Ziegler, W. O. Larson Foundry Co., Grafton, Ohio, T. Giszczak, Central Foundry Div., Defiance, Ohio, R. L. Dekker, James B. Clow & Sons Inc., Bensenville, Ill.

4 p.m.—Sand Session
Density-Sand Grain Distribution Effect on Physical Properties—T. W. Seaton, American Silica Sand Co., Inc., Ottawa, Ill.
The Use of the Shatter Test for Controlling Clay-Bonded Sand—W. B. Parkes, R. G. Godding, British Cast Iron Research Association, Birmingham, England. (Sponsored by British Cast Iron Research Association)
A Systematic Approach to Foundry Sand Design and Control—A. H. Zrimsek, G. J. Vingas, Magnet Cove Barium Corp., Arlington Heights, Ill.

4 p.m.—Steel Session
Castings for Replacement of Forgings and Fabrications at High Strength Levels—H. H. Harris, General Alloys Co., Boston.
Some Metallurgical Factors Influencing Austenitic-Manganese Steels—T. E. Norman, D. V. Doane, A. Solomon, Climax Molybdenum Co. of Michigan, Detroit.

5:30 p.m.—Exhibits close

7 p.m.—Alumni Dinner

8 p.m.—Ductile Iron Shop Course
Methods of Alloying—R. Aylward, Neenah Foundry Co., Neenah, Wis.; R. Carlson, American Cast Iron Pipe Co., Birmingham, Ala.; H. E. Henderson, Lynchburg Foundry Co., Lynchburg, Va.; D. Sanner, Cooper-Bessemer Corp., Mt. Vernon, Ohio.

8 p.m.—Gray Iron Shop Course
Fundamental Behavior of Gray Iron—H. L. Womochel, Michigan State University, East Lansing, Mich.

FRIDAY, MAY 13

8:30 a.m.—Registration opens

9 a.m.—Exhibits open
Philadelphia Day. (Free admission for local plant employees)

9:30 a.m.—Ductile Iron Session
Gating and Risering of Ductile Iron—Effect of Composition of Nodular Iron on Their Gating and Risering Characteristics—J. A. Davis, Battelle Memorial Institute, Columbus, Ohio; Gating and Risering of Green Sand Ductile Iron Castings—J. C. McCartney, John Deere Malleable Works, East Moline, Ill.; Gating and Risering of Ductile Iron Castings in Dry Sand Molds—D. M. Marsh, Cooper-Bessemer Co., Mt. Vernon, Ohio; Gating and Risering Shell Molded Ductile Iron Castings—H. O. Meriwether, Lynchburg Foundry Co., Lynchburg, Va.

9:30 a.m.—Fundamental Papers Session
Some Considerations in the Kinetics of Dephosphorization and Desulphurization of Basic Electric Steels—J. Zotos, E. DeLucca, Watertown Arsenal, Watertown, Mass.
Desulphurization by Calcium Injection Improves Properties of Cast Steel—D. A. Colling, P. J. Ahearn, Watertown Arsenal, Watertown, Mass.
Effect of Structure and Microporosity on Mechanical Properties of High Strength Cast Steel—S. Z. Uram, M. C. Flemings, H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.
Vacuum Induction Melting of High-Strength Steels—P. J. Ahearn, Watertown Arsenal, P. S. Schaffer, M. C. Flemings, Massachusetts Institute of Technology, Cambirdge, Mass.

9:30 a.m.—Heat Transfer Session
Measurement Versus Calculation of Solidification of Metal in Iron Molds—J. D. Keller, Associated Engineers, N. R. Arant, Roll Manufacturers Institute, Pittsburgh.
Demonstration of the Analogue Computer—V. Paschkis, Columbia University, New York.
Gas Formation in Permanent Mold Castings—J. G. Henzel, J. Keverian, General Electric Co., Schenectady, N. Y.

9:30 a.m.—Sand Session
Selected Principles of Soil Mechanics Related to Sand Testing, Molds and Cores—D. C. Williams, Ohio State University, Columbus, Ohio.
Effect of Variation of Some Physical and Chemical Conditions on Properties of Bentonite Suspensions—A. J. Anderson, G. J. Sutton, University of New South Wales, Sydney, Australia.
Casting Loss Reduction Program—H. W. Dietert, Harry W. Dietert Co., Detroit.

5 p.m.—Exhibits close

AFS AWARDS FOR 1960

Seven men will be recognized for their service to the castings industry during the AFS Congress in Philadelphia. Gold medals will be presented at the annual banquet on Wednesday evening, May 11. Scientific Merit and Service Citation awards will be made at the annual business meeting that morning

GOLD MEDALS

SAM F. CARTER has been chosen to receive the William H. McFadden Gold Medal "for exceptional contributions to AFS and the castings industry in the fields of cupola melting, electric steel melting, and control." Mr. Carter is assistant works manager of the American Cast Iron Pipe Co., Birmingham. He was graduated from Birmingham Southern College and received a master's degree from the University of Wisconsin. Prior to joining American Cast Iron Pipe Co., Mr. Carter was chemical analyst with TCI Div., U. S. Steel Corp. Prior assignments with ACIPCO have included research and testing, steel melter, electric furnace foreman, plant metallurgist and melting superintendent. Mr. Carter has been chairman of the AFS Birmingham District Chapter, a member of the Cupola Research Committee and the Refractories Committee, and a contributor to the *Cupola Handbook.*

WALDECK W. LEVI will be honored as recipient of the Thomas W. Pangborn Gold Medal in recognition "of his outstanding contributions to the society and the ferrous castings industry in the fields of cupola metallurgy, research, and operations." Mr. Levi is a graduate of the University of Michigan. Following graduation he completed a four-year apprenticeship with Deere & Co. which included training at the Union Malleable Iron Div., John Deere Harvester Works, and the company's central laboratory in Moline, Ill. Subsequently he was foundry metallurgist at the John Deere Tractor Works, Waterloo, Iowa. He joined Lynchburg Foundry Co., Lynchburg, Va., in 1934, advancing to chief metallurgist. In 1959 he established a professional consulting practice. Mr. Levi presented the Charles Edgar Hoyt Memorial Lecture in 1950. He has been chairman of the Gray Iron Division and a member of the Cupola Advisory Committee.

THERON D. STAY has been designated Joseph S. Seaman Gold Medalist in recognition of his "outsanding technical contributions to the society and the light metals industry over many years, particularly in alloying and casting." Mr. Stay has been technical advisor of Reynolds Metals Co. in Cleveland since 1944. A graduate of Case Institute of Technology, he joined the aluminum casting industry in 1917 as research metallurgist for Aluminum Castings Co., Cleveland, later becoming technical director. He joined the Casting Division of the Aluminum Co. of America, Cleveland, as technical director in 1923 and served in that capacity until 1944. Mr. Stay has been granted patents on aluminum alloy for pistons, and process patents on refining aluminum borings and the production of high-quality ingots. He has been a member of the Research Committee of the AFS Light Metals Division since 1944.

SCIENTIFIC MERIT

GEORGE P. HALLIWELL, director of research, H. Kramer & Co., Chicago, will be honored for "noteworthy achievements in the field of brass and bronze casting and for outstanding technical services to the society." Mr. Halliwell, graduated from Worcester Polytechnic Institute, was awarded a master of science degree from Yale University. Prior to joining the Kramer company in 1936, he had done metallurgical research at Westinghouse Electric Corp., East Pittsburgh, Pa., and had taught at Carnegie Institute of Technology, Pittsburgh. Mr. Halliwell was chairman of the AFS Brass and Bronze Division, in 1949-50, and has also been chairman of its Research Committee.

GEORGE A. TIMMONS, vice president and director of research, Climax Molybdenum Co. of Detroit, will be honored for "notable contributions and services to AFS and the ferrous foundry industry in the fields of heat treatment and alloying of gray iron." Mr. Timmons is a graduate of Wayne University, Detroit, and was awarded a master of science degree from the University of Michigan. Joining Climax Molybdenum Co. in 1936 as a research metallurgist, he became assistant director of the research laboratory in 1946 and assumed his present position in 1952. For several years Mr. Timmons has been chairman of the Heat Treatment Committee and member of the Executive Committee of the AFS Gray Iron Division.

SERVICE CITATION

WILLIAM M. BALL JR., metallurgist and foundry consultant, R. Lavin & Sons Inc., Chicago, is cited "for outstanding and inspirational services to AFS, its chapters, and the nonferrous castings industry over many years." Mr. Ball is a graduate of Carnegie Institute of Technology and held supervisory positions in the industry for 35 years. He was associated with Westinghouse Electric Corp., East Pittsburgh, Pa., Morgan Engineering Co., Alliance, Ohio, and Edna Brass Mfg. Co., Cincinnati, prior to joining the Lavin company 11 years ago. Mr. Ball is a charter member and a past chairman of the Cincinnati District Chapter. He has been a member of the Advisory Committee of the AFS Brass and Bronze Division and first chairman of its Recommended Practice Committee.

VICTOR E. ZANG, vice president of research and development, Unitcast Corp., Toledo, Ohio, has been cited "for tireless and continuous efforts on behalf of the AFS and the steel casting industry in promotion of co-operative technical endeavor." Mr. Zang attended the University of Toledo and joined Unitcast, then Industrial Steel Casting Co., in 1922. He was made works manager in 1937 and has served in his present capacity since 1947. Mr. Zang is a charter member and first chairman of the Toledo Chapter of AFS. He has been active in the work of the AFS Steel Division and was chairman of its Executive Committee in 1955-56.

Questions and Answers

Electrically heated and fuel-fired reverberatory furnaces are used to melt cast iron . . . Aluminum must not be held too long after sodium addition . . . Failure of casting probably due to shrinkage porosity

Melting of Gray Cast Iron

Part of our manufacturing process includes operation of a nonferrous foundry in rented quarters some distance away, and we are thinking of eventually moving that operation to our main plant. We also are using approximately 1½ to 2 tons of light gray iron castings a day based on an annual consumption of 2 to 2½ million lb. Since the delivery of those castings is becoming more of a problem, we thought we might establish a gray iron foundry when we moved the nonferrous foundry. Our objection to a gray iron foundry, however, is that a cupola has to be used for melting the iron, but we feel that if the iron could be melted successfully by some other method, we would be more interested.

Although the cupola is a very economical and rapid melting unit for gray iron, several other types of furnaces are being used. They include electric arc, electric induction, and reverberatory-type furnaces. Two types of arc furnaces are available—the direct and indirect arc units. Induction furnaces include the low-frequency or 60-cycle, and the high-frequency type operating on 960 cycle or higher power. Reverberatory type furnaces may be oil or gas fired.

In general, those types of melting units are employed as batch melters—that is, they are charged with a given weight of metal which is melted, subjected to refining or adjustment of composition if required, brought to temperature, and removed from the unit in ladles to be poured. With direct-arc electric furnaces, however, semi-continuous melting may be used. In that operation the charge is melted down and raised to the desired temperature. Then a portion of the molten metal is removed for pouring and is replaced by cold metal. When the bath again reaches the desired temperature, the cycle is repeated.

As might be surmised, the latter practice depends on a number of factors, primarily the length of time required to raise the cold metal addition to the desired temperature. One might take a 2-ton furnace which will melt and bring 4000 lb of iron to temperature in 2 hours, and assume that 500 lb could be taken out and replaced with cold metal which would be up to temperature in 15 minutes. This means that every 15 minutes 500 lb of molten metal is available for pouring and, including the initial charge, 8 tons of metal could be melted in 8 hours.

Similarly, one foundry is using a low-frequency induction furnace with a capacity of 5000 lb, and every 20 minutes 400 lb of iron is removed and replaced with 400 lb of cold material, which gives a melting rate of about 1200 lb an hour. Possibly such an arrangement might be made with the indirect arc and reverberatory type furnaces, but we do not recall seeing any specific mention of such practice.

In the case of reverberatory furnaces one might operate two units in a staggered sequence so that molten metal would be available throughout the day beginning in the morning after sufficient molds have been made to start pouring.

In looking over the figures you mention, we note that you refer to an annual consumption of 2 to 2½ million lb which, on the basis of a 250-day year, means 4 to 5 tons a day rather than the 1½ to 2 tons per day you indicate. Assuming a 65 per cent yield in castings, you will have to melt 6 to 8 tons of gray iron a day.

Adding Sodium to Aluminum

Some time ago we saw a reference to the application of metallic sodium additions to aluminum alloys to prevent a mottled appearance on the surface. We would like to have information on a good way to add metallic sodium when using an electric induction furnace. We have had difficulty in getting enough sodium into the metal to achieve the desired results. We pour at 1400 to 1450° F.

Addition of metallic sodium to aluminum alloys is not too difficult, but we advise against trying to do it in the induction furnace. The "pinch effect" or rolling action of the bath tends to cause a more rapid loss of sodium.

As you undoubtedly know, sodium as a modifier is termed a "fugitive" element since its effect disappears after a period of time. Hence, the molten metal after addition of the sodium should not be held for long periods before pouring. Reaction between the sodium and aluminum to accomplish modification takes from 3 to 5 minutes.

Suggested procedure is to wrap the sodium in aluminum foil, place it in a graphite "phosphorizer" and plunge to the bottom of the metal which has been placed previously in a preheated crucible or ladle. Another method is to place the sodium on the bottom of the crucible and pour the aluminum over it. Sodium is light, however, and will tend to float to the top of the bath, and it will have little effect.

Metallic sodium is available in sticks about ⅝ in. in diam, and a piece 3 in. long will weigh about ½ oz. Sodium must be kept under kerosene free from water and oxygen, and must not be touched with the hands.

Shrinkage Present at Break

We are forwarding for your consideration a half section of an eccentric pin from a steel casting which failed in service. The pin, about 3⅜ in. in diam and 5 in. long, is located at the outer periphery of a disc 24¼ in. in diam and 1¾ in. thick. The pin broke off at its junction with the disc. It is used on a loading machine and drives a large gathering arm which sweeps material onto a conveyor. The pin is subjected to considerable shock in use.

Composition of the steel is 0.30 to 0.38 per cent C, 0.70 to 0.90 per cent Mn, 0.50 per cent max. Si, 0.40 to 0.60 per cent Cr, 0.60 to 0.90 per cent Ni, and 0.17 to 0.25 Mo. Heat treatment consists of annealing at 1700° F and furnace cooling; heating to 1650° and oil quenching, and tempering to 241 to 285 Brinell. We are enclosing a photograph of the other half of the pin after etching in which it appears there is no shrinkage present.

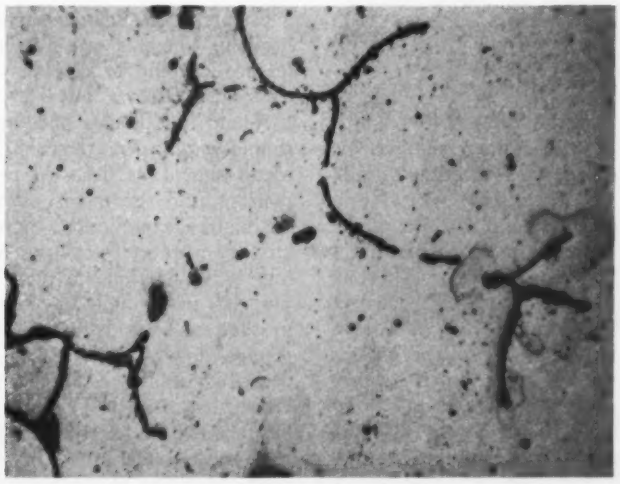
Photograph of the etched section shows a dendritic pattern in the central portion. This condition may have resulted from insufficient time at temperature or too low a temperature during the annealing treatment to obtain satisfactory homogenization of the structure. Steels with dendritic structures tend to be low in tensile and impact properties.

Further, the lower portion in the photograph, close to the fracture, suggested the possibility of unsoundness, and visual examination of the section of the pin forwarded to us presented the same appearance, but neither was sufficient to provide positive evidence.

Acid etching reveals microshrinkage which is present near fracture. 2½X

To determine whether an unsound condition was present, the half pin was sectioned about 1 in. above the fracture, polished and etched with a mixture of nitric acid, acetic acid, and alcohol. Examination under low magnification showed numerous small holes as depicted in the accompanying illustration, which is enlarged photographically about 2½ times. These holes are indicative of microshrinkage in the section. It is shown more clearly in the micrograph of a polished but unetched area at a magnification of 700 diameters.

Dendritic structure is present



Enlargement to 700X shows shrinkage condition more clearly

Cylinders Are Out of Round

We are trying to produce small bronze, aluminum, and cast iron cylinders about 3¼ in. in diam by the shell molding process, but find that we cannot obtain true cylinders because the dimension across the parting line is greater than that with the parting line. Can you suggest a remedy?

Obtaining true cylinders in shell molding is somewhat difficult, probably due to the rib effect or stiffening action developed by the joint between the two mold halves. Use of a thicker shell or higher percentage of resin might overcome the trouble, or perhaps the backing material employed is not compacted sufficiently to prevent deformation of the shell.

One remedy might be to modify the pattern and the corebox to accommodate the differences in dimensions of the castings. Another procedure would be to incorporate a stiffening wire or rod along the top of the mold. Invest the pattern with the resin-sand mix for period sufficient to produce a shell about ⅛ in. thick, and turn back the dump box. Then the wire is placed in position, using a little resin-sand to hold it in place, and the assembly is reinvested to produce a shell of the usual thickness. Finally the shell is cured in the conventional manner.

Making Cast Copper Tuyeres

I am in this country undergoing a training period with one of the leading ingot steel producers, and later will be the assistant superintendent of the foundry in a new steel plant being erected in Argentina. I will appreciate receiving information on production of copper castings such as tuyeres and cooling plates for blast furnaces.

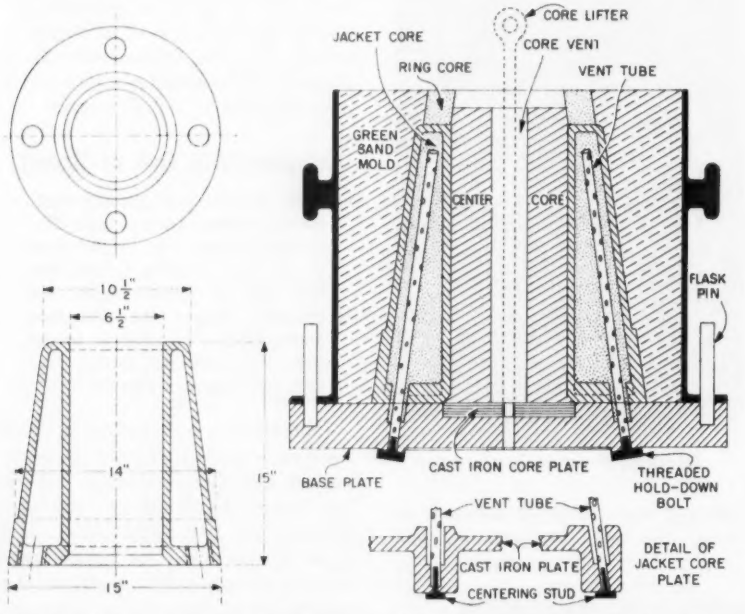
Tuyeres for blast furnaces are produced by several methods, including casting in dry sand or green sand molds. They may be made with the large diameter up and the jacket or chamber core suspended from the cope or supported by chaplets in the bottom, or made all in the cope with the large end down resting on the water inlet cores and wiring through the drag.

Some years ago an excellent method was described, and we suggest its application in your foundry. In this procedure the casting is molded and poured with the large end down. The entire body is enclosed in a one-piece cast iron flask. The drag is formed of a cast iron plate ribbed on the bottom to provide strength and rigidity. Its face is machined to a true plane and carries a small gate channel from near one corner to a point near the print for the center core, as well as holes accurately drilled for the core prints and flask guide pins.

Hole for the center core print is ¾ in. deep with slightly tapered sides to receive a round iron plate of the same conformation on which the core is rammed in a separate box. A similar print in the corebox insures proper location of the core. Center core is green sand made from a mixture of new and old molding sands to provide a "strong" sand. A vent hole about 2 in. in diam in the center of the core carries away any gases. After making, the core and supporting plate are lifted by a suitable eye-bar, set in the print on the drag plate, and the bar removed.

The jacket or chamber core is made on a jolt molding machine. A cast iron ring plate is used which forms a support for handling the core until after it is baked as well as for proper location of the vent tubes and formation of the water inlets. As indicated in the lower portion of the accompanying sketch, the vent tubes are placed in pockets in the plates on studs to hold them in the proper position. The pockets also form the water inlets or projections on the core.

Vent tubes are ⅝ in. in diam and pierced with numerous small holes. The bottom portion is threaded internally for fastening with bolts when placed on the drag plate. The core usually is made from half coarse bank (low clay) sand and half silica sand, and bonded with pine resin (colophony) binder, but there is no reason why it cannot be made with some other type of binder. After the core is baked, it is removed from the supporting ring, set in place on the drag, and bolted down firmly.



Sketch at left gives dimensions of water-cooled copper tuyere. Right shows some details of the suggested molding procedure to be followed.

As indicated earlier, the drag plate contains holes for the reception of the center core supporting plate and a portion of the water inlet cores. The latter holes are about 1 in. deep and, of course, the same diameter as the core. Remainder of the hole through the plate is ⅝ in. in diam to receive the end of the vent tube. Drag plates are elevated about 18 in. above the floor on steel framework to provide access for bolting the core in place. The cope mold is made in green sand in a square flask, and the center core is held down with a ring core tapered slightly on the inside and outside diameters.

Cooling plates are not as complicated as tuyeres to make, and can be made as outlined, using perforated tubes in the water inlet and outlet openings. These tubes are bolted through the bottom as in the case of the tuyeres. Pouring preferably is through a row of small pencil gates across the top, using a runner basin extending to the edge of the mold. The basin extension permits pourers to fill the mold cavity without having to hold the ladle lip at any great height, thus decreasing turbulence and air inspiration.

Copper is melted as rapidly as possible. There is considerable difference of opinion on the use of charcoal as a cover, but if it is used it should be dust-free and dry, and should be placed on the cold charge. Metal should be degassed prior to pouring into the molds by use of lithium, calcium boride, copper oxide, dry nitrogen, etc. After degassing, it is preferable to pour a test plug 1½ in. in diam and 3 in. long in sand to see whether it shrinks or pipes down properly. If not, more degasifier should be added and another plug poured. The best pouring temperature for the castings will have to be determined by experiment, and you might try 2150° F as a starting point.

GRINDING WHEELS

No gaps in the "U.S." Foundry Line

There are no missing wheels in the "U.S." Foundry Line. It's complete. The shop foreman can pick with certainty superior wheels for every and any snagging operation. These resinoid-bonded wheels are noteworthy for the removal of maximum metal per hour, coupled with uniform wheel wear resulting in almost complete elimination of dressing. Included in this *complete* line is the famous Flexlite® Raised Hub Portable Wheel built by unerring electronic control to make it a safe wheel. Also there is the Royalite® Hard Shell Cup Wheel with an extra hard rim to hold its sharp cutting edge.

The U.S. Grinding Wheel sales engineer can help you cut your costs sharply. We would welcome a word from you. Write to U.S. Rubber, Grinding Wheel Dept., 10 Eagle Street, Providence, R. I., or address below.

Mechanical Goods Division

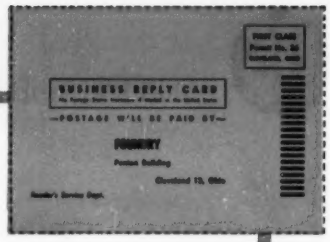
United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Circle 646 on Page 53

For More Information
Use Reply Card—Page 53

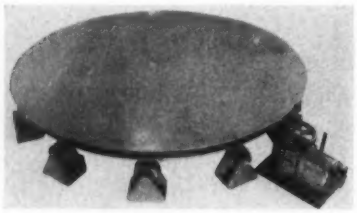


What's New in Equipment and Supplies

PRODUCTION TURNTABLES

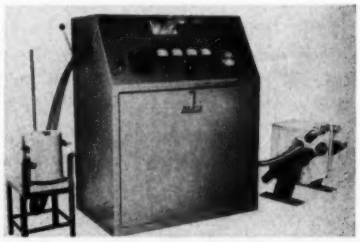
Turntables are suitable for use with automated foundry production equipment. The units are available in manually operated or power-driven models. They come in diameters and capacities to fit all but very large or heavy applications. Top plates can be supplied in plain, checkered, grooved, or raised rail styles.—**Chase Foundry & Mfg. Co.**, 2900 S. Parsons Ave., Columbus 7, Ohio.

For More Details Circle No. 460—Page 53



INDUCTION MELTING UNIT*

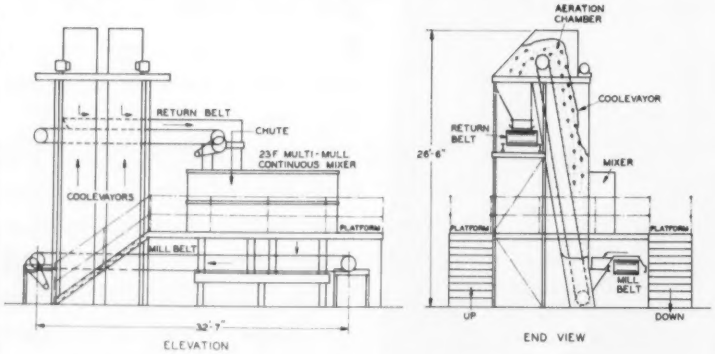
Integral 50 is a compact, 50-kw, combination motor generator and control unit for high-frequency induction melting. Unit contains the power supply, capacitors, control and safety devices necessary to operate one or two furnaces or coils, including an 8-step auto transformer and a 32-position capacitor switch. This switch provides maximum flexibility in meeting any heating or melting requirement.



Installation requires only a 60-cycle, 440 or 220-v power connection, a cold water connection, and a water drain. Unit can be mounted on casters and used wherever proper power and water supplies are available.—**Inductotherm Corp.**, 412 Illinois Ave., Delanco, N. J.

For More Details Circle No. 461—Page 53

Equipment Mulls, Aerates, and Cools Sand*



Sand conditioning system includes Model 23F Multi-Mull, a continuous muller, arranged to discharge continuously to a mill belt serving two Coolevayors. The cooling equipment is designed to elevate, aerate, and cool the sand from 200° F or more to within 20° F of room temperature, before discharge to a return belt which recharges the muller. System is rated at 180 tons per hour.—**National Engineering Co.**, 646 Machinery Hall Bldg., Chicago 6, Ill.

For More Details Circle No. 493—Page 53

CO_2 CORE COATING

CO_2 Shell Coat protects CO_2 cores and molds from high temperatures and high humidity. Coating is useful on thin sections and where sharp corners and edges must be maintained. Strength, stiffness, and smoothness are added to the surfaces. The coating can be applied quickly by spraying or dipping. **Para Products Div., Foundry Rubber Inc.**, 5200 River Rd., Washington 16, D. C.

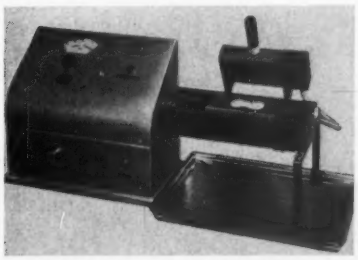
For More Details Circle No. 462—Page 53

SAND TENSILE TESTER*

No. 365 hot resin-sand mix tensile tester is designed for curing and testing shell mixes for tensile

strength at curing temperatures. Sand mix is placed in an electrically heated split mold, cured for a preset time, and subjected to tensile stress in the curing position without handling the mold.

Unit can be used for production control because less time is required than with room temperature tests. Good reproducibility and accuracy are obtained since the specimen is



not disturbed until application of load.—**Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 463—Page 53

BLAST EQUIPMENT PARTS*

Premium alloy replacement parts for use in airless blast equipment have long service life, according to the manufacturer. The line of parts includes impellers, control cages, and blades for most blast cleaning equipment. Distributor of the line is Alloy Metal Abrasive Co., Ann Arbor, Mich.—**Benfur Engineering Co.**, 143 Katherine, Grand Rapids 5, Mich.

For More Details Circle No. 464—Page 53

PHENOLIC RESINS*

Crushed novolak phenolic resin, No. 21118, is designed for producing hot coated sand with a lower "stick point" than obtainable under equivalent conditions with the company's No. 18369 resin.

No. 19602 liquid phenolic resin is designed for cold coating work, and is said to provide improved thermal characteristics. This resin reportedly reduces thermal cracking in shell molds in several types of applications.—**Durez Plastics Div., Hooker Chemical Corp.**, 1004 Walck Rd., North Tonawanda, N. Y.

For More Details Circle No. 465—Page 53

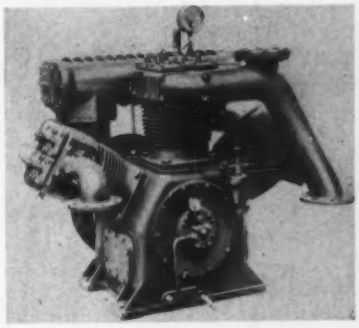
DUSTLESS WOOD FLOUR*

A newly developed wood flour is said to be dust-free and to have properties identical to those of regular wood flour produced by the company. A sample of the product, known as Hygeia wood flour, is being offered to users of cellulose materials. The company states that pouring the flour from the small sample bag will demonstrate the material's lack of dust diffusion.—**Penn-Rillton Co.**, 324 W. 23rd St., New York 11, N. Y.

For More Details Circle No. 466—Page 53

AIR COMPRESSORS*

All-purpose compressors of the CR series deliver air in volumes of 174 to 338 cfm. The machines are designed for heavy-duty, three-shift operation. They can be installed permanently or operated as skid-mounted machines. The two-stage, single-acting units feature air-cooled



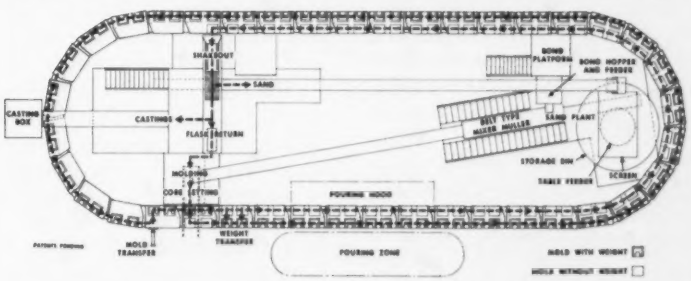
cylinders and cylinder heads to facilitate the flow of lubricating oils and to eliminate condensation. Machines are rated for working pressures up to 125 psi.—**Atlas Copco**, 545 Fifth Ave., New York 17, N. Y.

For More Details Circle No. 467—Page 53

BLAST CLEANER*

Model B Shalco Jet Blaster is for rapid cleaning of coreboxes and patterns. Because coreboxes or pattern

Mold Handling System Has Continuous Loop*



Double MLC mold handling system is of continuous loop design, with molds carried side by side on each car. Molds, either snap or tight flask, are set out in outside position on the car, poured, make almost a complete pass around the loop, and then are transferred automatically to inside position, and removed automatically at shakeout.

This system provides the same cooling time as a conventional mold conveyor of twice the length. Consequently, substantial savings are achieved in floor space, equipment, building, and other facilities. The Double MLC system is suitable for handling any size or type of mold, with any metal being poured, as long as the molds can be set out, closed, and the molds poured while the conveyor is in motion.—**C. O. Bartlett & Snow Co.**, 6200 Harvard Ave., Cleveland 5, Ohio.

For More Details Circle No. 494—Page 53

plates can be blast cleaned either hot or cold, they can be cleaned while mounted on a shell machine without reducing temperature.

Unit has 6 ft of abrasive supply hose, ¼-in. nozzles, and ⅛-in. air jets which are heat treated for durability. Comfortable, long-wearing head and neck hood is provided. Minimum air pressure of 90 psi through a 5/16-in. air hose is recommended.—**Shalco Div., National Acme Co.**, 170 E. 131st St., Cleveland 8, Ohio.

For More Details Circle No. 468—Page 53

TRACTOR-SHOVEL*

Model H-30 Payloader, tractor-shovel, has an operating capacity of

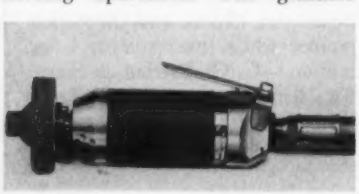
3000 lb and is equipped with a 1-cu yd (SAE-rated) bucket. Four-wheel drive features full power-shift Paylomatic transmission with matched torque-converter. With three speed ranges in each direction, all shifts can be made without stopping for range shifts.

The H-30 is powered by a 77½-hp heavy-duty gas engine. Clearance under the cutting edge is 8 ft, 4 in. and dumping reach ahead of the front tires is 29 in. Other features include four-wheel hydraulic brakes, numerous safety controls, and accessibility.—**Frank G. Hough Co.**, 703 Seventh Ave., Libertyville, Ill.

For More Details Circle No. 469—Page 53

PNEUMATIC GRINDERS

Series 921 pneumatic grinders offer a choice of ten operating speeds—from 16,000 to 25,000 rpm—for deburring, die grinding and contouring, flash removal, snagging, weld smoothing, and other metal removing operations. The grinders



are said to be compact and well balanced. Units are available in spindle and collet chuck models with lever, pushbutton, or ring-throttle control.—**Thomas C. Wilson Inc.**, 21-11 44th Ave., Long Island City 1, N. Y.

For More Details Circle No. 470—Page 53

FLASK SHAKEOUT*

Company's line of pneumatic bail-type flask shakeouts now includes a 5-in. "V" Special. The shakeout is powered by a Type LST long-stroke piston, heavy-duty vibrator unit. The shakeout is said to save man-hours and reduce damage to flasks. Units are engineered and built to meet individual specifications.

Compressed air powers the vibration unit. Vibration frequency and intensity can be regulated by changing the air pressure. Air pressure of 80 psi produces 1440 vibrations per minute. — **Cleveland Vibrator Co.**, 2828 Clinton Ave. W., Cleveland 13, Ohio.

For More Details Circle No. 471—Page 53

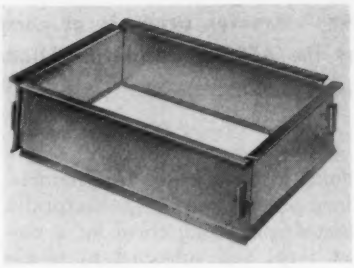
Foundry on TV

At the AFS Foundry Exposition in Philadelphia, Planet Corp., Lansing, Mich., will employ television to show its automatic mold handling system installed at Universal-Rundle Corp.'s Camden, N. J., foundry. Three manned cameras in the foundry will be connected to three monitors in Planet's booth. The closed-circuit TV system will operate continuously during the show. Explanations of the operations will be given by personnel at the booth.

POURING JACKETS*

Ster-Linked pouring jackets have one locking corner. Three corners of the jackets have quick-connect joints which operate on conveyor chain-link principle. Corners adjust automatically to any mold angle between 3 and 5 degrees.

Tapered, self-positioning lower flanges eliminate the possibility of sand cut-ins. Upper reinforcing flanges act as lifting handles. Complete range of sides and ends, in



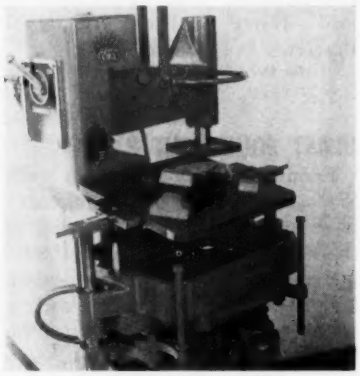
various depths, is available.—**Sterling National Industries Inc.**, 7100 West Walker, Milwaukee 14, Wis.

For More Details Circle No. 472—Page 53

JOLT, SQUEEZE MACHINE*

Type HPL jolt squeeze pin stripper can be arranged for alternate production of copes and drags from a double-sided pattern plate. A drag is produced and drawn. Then small trunnions at the ends of the pattern plate are engaged by a lifting device and the plate raised, turned 180 degrees, and lowered for producing a cope.

Machine features heaters arranged



on the table surface for warming the side of the pattern plate next to be molded. — **British Moulding Machine Co. Ltd.**, Weston Works, Faversham, Kent, England.

For More Details Circle No. 473—Page 53

MOLD AND CORE BINDER*

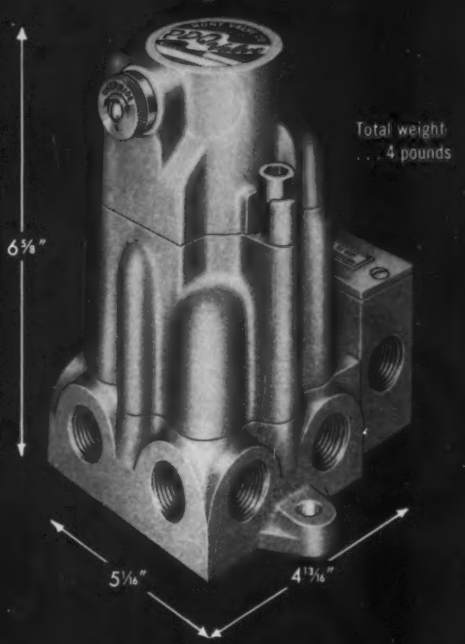
Binder conditions sand molds and cores for casting without baking. Ceco-Set is intended for production, semiproduction, and jobbing work for iron, steel, and nonferrous casting. Cores can be drawn and patterns removed immediately from sand containing the binder.

Binder is used without ramming. In place of baking, Ceco-Set prepared cores or molds are air-dried for 4 to 10 hr. Complete collapsibility during shakeout is claimed,

Circle 647 on Page 53→

THE HUNT PDQ

has Faster Response Time and Greater Capacity than Air Valves—*4 Times Its Weight and Twice Its Size!*



You asked for a light, compact valve

Here is a full 1/2" air valve at **4 pounds.** It will flow 335 c.f.m. with 100 p.s.i.g. initial pressure to atmosphere. It measures 6-1/2" high by 5-1/16" wide by 4-13/16" deep.

You asked for speed and capacity

Here is what the Hunt PDQ is capable of. Response time to fill a 140 cubic inch vessel to 90 p.s.i.g. with an initial pressure source of 100 p.s.i.g. is .113 seconds. (6.8 electrical cycles.) To exhaust the same vessel from 90 to 10 p.s.i.g. is .195 seconds. (11.7 electrical cycles.)

The short-stroke pilot actuates a compact, full-orifice poppet-spindle amazingly fast . . . renders traditional air valves obsolete.

The Hunt 1/2" PDQ air valve is designed to do the things you've wanted a valve to do since the advent of automation. Write us today.

N. C. HUNT, PRESIDENT

HUNT VALVE COMPANY · SALEM, OHIO, U. S. A.

- ☑ Accessibility
- ☑ Simplicity
- ☑ Speed and Capacity
- ☐ Price and Quality

The Hunt PDQ valve tops them all in every class.

Next month . . .
the PRICE and QUALITY story.

HUNT H V C ***Quick-As-Wink*** AIR & HYDRAULIC CONTROL VALVES

cost-conscious foundries are switching to ARCAIR

THE ARCAIR PROCESS

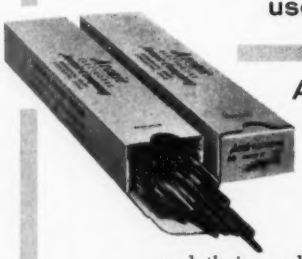
Foundries show dramatic production increases and cost decreases using Arcair for removing defects in castings, washing off riser pads and general casting clean-up work. The Arcair torch leaves a clean, even surface that often eliminates grinding or finishing.

HOW DOES ARCAIR WORK? — The Arcair torch uses air from an 80 psi air line, current from a welding machine and special COPPERCLAD electrodes to melt and remove metal. Fifteen minutes' instruction is all an operator needs.

Five torch models for foundry use... prices start at $76.50

MELTIME arc-time recorder

A precision instrument for split-minute measurement of Arcair and welding operation time. Fool-proof clock records work-time in minutes and tenths of minutes. Provides a truly fair basis for incentive pay operations. Available in AC or DC models starting at $99.50



Arcair Copperclad electrodes

No matter how you use Arcair, maximum results are obtainable **only** with genuine Arcair COPPERCLAD electrodes. Arcair electrodes are the finest that the world's largest carbon research laboratory has been able to develop — and their quality is consistent. They withstand higher amperages, move more metal faster, are cooler operating, and therefore assure minimum torch maintenance. Your trained Arcair welding supply distributor is qualified to specify proper size, dependent on your application.

THE ARCAIR COMPANY
465 S. Mt. Pleasant St., Lancaster, Ohio

Send me information on the following: ☐ The Arcair Process
☐ Arcair Meltime Recorder ☐ Arcair COPPERCLAD electrodes

Name _____ Title _____

Company _____

Address _____

City _____ State _____

Visit Us in Booth No. 1239
64th Casting Congress, Philadelphia, May 9-13

Arcair®

The time- and money-saving way to cut, gouge, bevel, groove all metals!

and it is said that no objectionable odor is present.—**G. E. Smith Inc.**, 246 Washington Rd., Pittsburgh 16, Pa.

For More Details Circle No. 474—Page 53

PLASTIC REFRACTORIES*

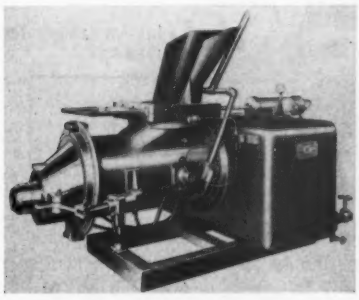
H-W Mullite and H-W Coralite plastic refractories are for high tem-

perature service. Products reportedly have excellent volume stability when used in electric furnace roof centers, as illustrated. H-W Mullite is a 70 per cent alumina plastic refractory and H-W Coralite is an 80 per cent alumina plastic refractory. Both are shipped in 100-lb cartons wrapped in polyethylene to assure maximum workability in storage.—**Harbison-Walker Refractories Co.**, 307 Fifth Ave., Pittsburgh 22, Pa.

For More Details Circle No. 475—Page 53

MOLD AND CORE SHOOTER*

Model H-80T shooter is for manufacturing five or six ft long green sand molds for centrifugally cast soil pipe with single or double hubs. Molds are shot in a fraction of a second, resulting in a mold of extreme and uniform hardness. A mold is placed horizontally and, after the pattern is stripped, is carried to a horizontal centrifugal spinning machine. These shooters also are used



for manufacturing long pipe cores, shooting sand horizontally over an arbor. — **Hansberg Shooters Inc.**, 3213 Central St., Evanston, Ill.

For More Details Circle No. 476—Page 53

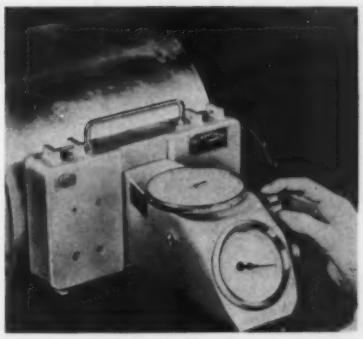
COUNTERSINKING TOOL

Tools countersink belt fasteners in heavy conveyor belt covers. Countersinking permits clean scraper operation, lengthens fastener life, eliminates noise on return idlers, and minimizes wear on idler bearings. Vertical and horizontal countersinking tools are used in the operation.—**Flexible Steel Lacing Co.**, 4607 Lexington St., Chicago 44, Ill.

For More Details Circle No. 477—Page 53

HARDNESS TESTER

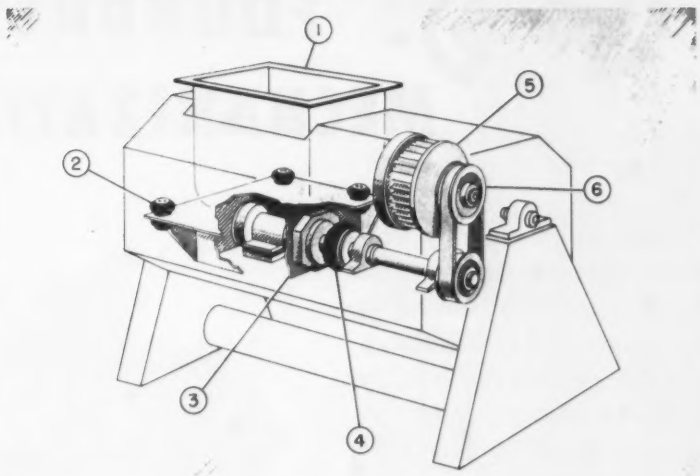
Indentometer, portable Rockwell hardness tester, can be fitted with an electromagnetic or chain clamp, eliminating part size and configura-



tion restrictions. Hydraulic pressure unit applies a minor load of 10 kg and a major load up to 150 kg for normal testing procedures. Readings are direct in Rockwell A, B, or C scales.

The optional electromagnetic

Cushioned Vibratory Unit Cleans Castings



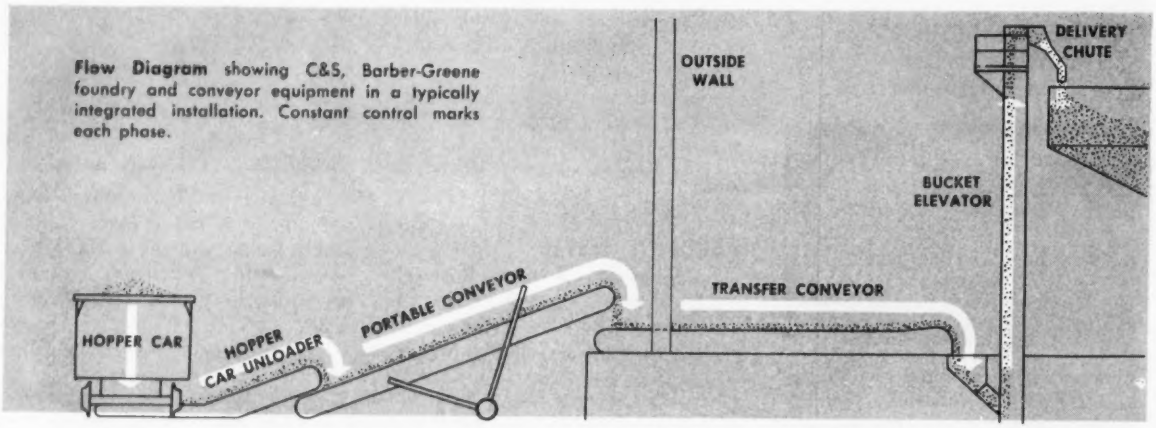
Vibratory finishing machine employs an air cushion suspension system. Machine features positive and convenient controlling of both frequency and amplitude of the vibratory work load. Unit is adaptable to cleaning, descaling, deburring, radiusing (to exact blueprint specifications), fine polishing, coloring, and burnishing. Process is suitable for practically all ferrous and nonferrous metal parts.

Vibration is generated by a short, heavy-duty eccentric shaft mounted with minimum spacing between support bearings for maximum rigidity. Weights can be added or removed from the eccentric to change vibratory amplitude. Unit has no cams, cranks, or other fast-wearing mechanical linkage. Optional equipment is available to provide infinite and automatic speed control where necessary.

Machines come in five cubic foot sizes—1½, 3, 6, 12, and 18—with larger models soon available. Illustration shows: 1. Work container. 2. Air cushion. 3. Adjustable eccentric shaft. 4. Annular coupling. 5. Pancake induction motor. 6. Variable speed sheave.—**Pangborn Corp.**, P. O. Box 380, Hagerstown, Md.

For More Details Circle No. 495—Page 53

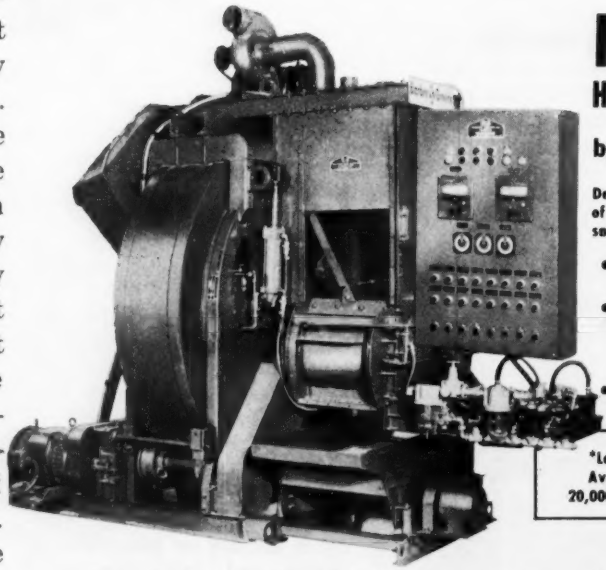
ALL ALONG



Flow Diagram showing C&S, Barber-Greene foundry and conveyor equipment in a typically integrated installation. Constant control marks each phase.

C&S FOUNDRY EQUIPMENT MECHANIZATION THROUGH

Whether your foundry operation is large or small you can't afford to overlook the many advantages of mechanization. It is the key to economic life in today's highly competitive market. As specialists with years of experience in foundry mechanization we stand ready to give you the benefit of that experience where you need it most. Whether you require one machine or an entire installation, C&S will plan, construct, and install the right equipment for the right job. A phone call, letter or wire will put the nearby C&S representative on your team within 24 hours. Why not contact him today? It's the first important step to practical mechanization.



The
MIXALL
HEATER-MIXER
by C&S

Delivers up to 3,000 lbs. of resin-coated, free-flowing sand per hour*.

- Uniform pugmill mixing.
- Independently controlled, simultaneous heating and mixing cycles.
- Instant temperature reading.

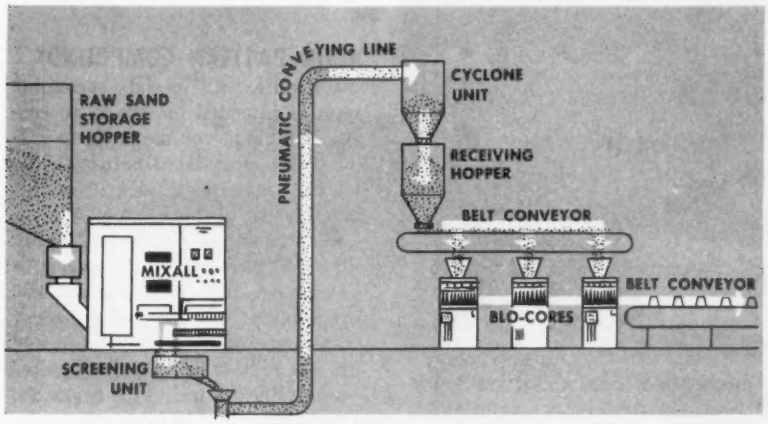
***Larger Models Available up to 20,000 lbs. per hour.**

The MIXALL coats all available sands, wet or dry, with all commercial resins, liquid or powder. You keep quality up and manpower costs down. Production schedules are easily followed because the MIXALL is completely automatic.

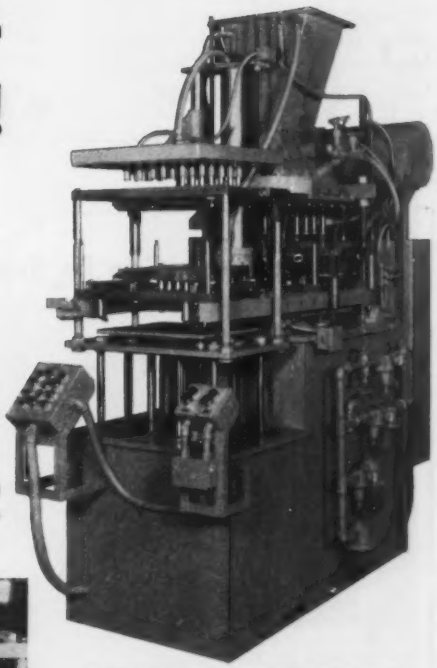
Write today for bulletin CS-806

SAND (WET or DRY) + HEAT + RESIN (LIQUID or LUMP) "HEXA" → COATED SAND (FREE FLOWING - LUMP FREE)

THE LINE...



ASSURES PRACTICAL CONSTANT CONTROL!



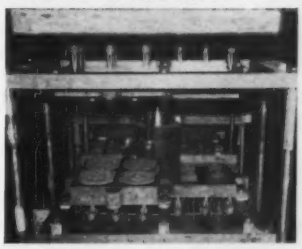
The
GAS-FIRED BLO-CORE
AUTOMATIC SHELL MACHINE by C&S

So flexible it produces SHELL CORES & SHELL MOLDS simultaneously!

- Horizontally Parted Boxes . . . up to Sizes 24" x 32" x 16" Draw.
- Vertically Split Boxes . . . up to Size 24" x 15" x 24" High.

From the coated sand in the hopper to the finished shell, the gas-fired BLO-CORE is completely automatic. Produces highest quality shell cores and shell molds faster and at lower operating costs than ever before.

Write for full information on Model H-1622 HP GF BLO-CORE



- Rotary, Two Station Machine.
- Fully Automatic Operation.
- Up to 100 Blows Per Hour.
- Easy and Rapid Changeover of Boxes
- Available in 2 Sizes.

See the C&S Equipment in OPERATION at the AFS Foundry Show in Philadelphia! Visit us at Booths 903 and 1004!

"Constant Quality through Constant Control"

C&S PRODUCTS COMPANY, INC.

18656 FITZPATRICK
DETROIT 28, MICHIGAN

AFFILIATED WITH Barber-Greene

clamp, shown here, can be applied to flat or curved surfaces. The chain clamp enables mounting against large work. Standard equipment includes a cone diamond penetrator, a ball penetrator, a standard C-clamp, flat and "V" anvils, and a test block.—**Steel City Testing Machines,** 8817 Lyndon Ave., Detroit 38, Mich.

For More Details Circle No. 478—Page 53

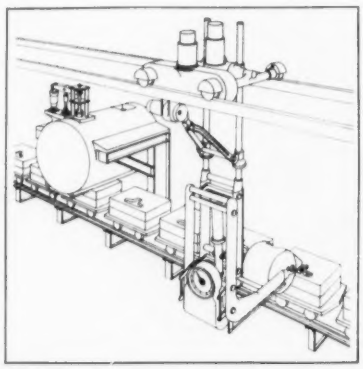
BLAST CLEANER*

Airless, noncentrifugal blast cleaning machine hurls abrasive against the work by what is described as "impact phenomenon." Shot, grit, or other abrasive is fed from hoppers in the bottom of the machine onto the impact blades. The abrasive is hurled upward through the all-around-open work container to the pieces to be cleaned. Volume and velocity of shot are adjustable to meet requirements. The machines are available in 3 and 7 cu ft capacity models.—**Walker Peenimpac Machine Mfg. Div., Walker Pump Co.,** 546 11th St., Brooklyn 15, N. Y.

For More Details Circle No. 479—Page 53

POURING DEVICE*

Pourmatic automated pouring method is suitable for production of gray iron and malleable iron castings. The device was developed for



mechanized high-production foundries using continuous car or indexing type mold conveyors. Two pouring ladles can be serviced from one holding ladle. Since each pouring ladle employs two individual stoppers, a mold with two separate pouring basins and two independent gating arrangements within the same mold can be poured. Numerous safety devices are built into the control system. Excellent pouring technique is said to be achieved by use of this pouring method.—**International Automation Corp.,** 121 Huron View, Ann Arbor, Mich.

For More Details Circle No. 480—Page 53

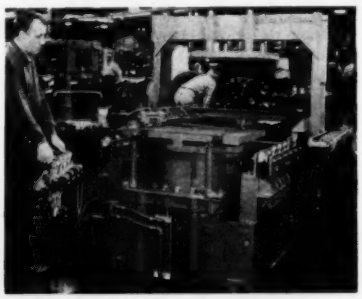
RESIN PATTERN COMPOUND*

Calcerite, a special melamine resin, is intended for use as an economical, large volume back-up material for epoxy-faced patterns. The back-up material is said to handle like plaster of paris, employing a small amount of water, but is considerably stronger when set. It is claimed that serviceability and adaptability of nonporous epoxy pattern tooling have been improved by use of the back-up material.—**Furane Plastics Inc.,** 4516 Brazil St., Los Angeles 39, Calif.

For More Details Circle No. 481—Page 53

MOLDING MACHINE*

A feature of SK series molding machines is roll-on, roll-off fast un-



loading from any side. V-guides result in true alignment of the squeeze head. Draw mechanism is modified for equal load distribution on all parts of the draw unit.

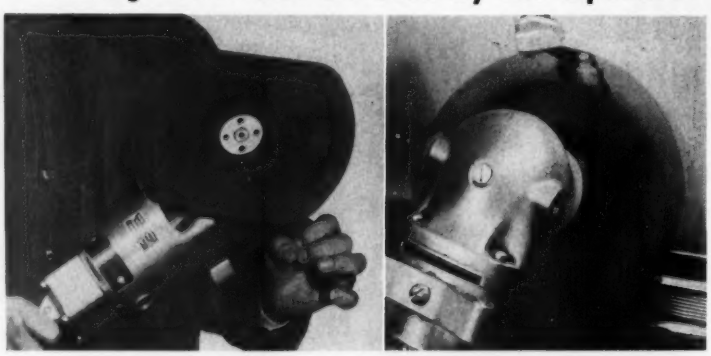
The SK series can be used for drop-strip, pin lift, or pin push-up. Machines can be rigged easily for multiple molding. — **International Molding Machine Co.,** La Grange Park, Ill.

For More Details Circle No. 482—Page 53

RESIN-COATED SAND*

Resin-coated sand increases rates on mold and core production because it is fast curing. The sand, called Faskure, is a combination of exclusive formulas and a hot-coating process, uniformly distributing resin over each grain of sand. Every batch of Faskure is tested for melt point, tensile strength, and rate of

Grinding Work Can Be Seen By the Operator



A fiber-backed abrasive disc with two parallel straight sides is called Vizi-Disc. Product is a rectangular section with a radius at each end, as shown at the left. As the disc rotates, an inch at its outer edge becomes transparent, as shown at the right. Grinding is faster because the abrasive disc does not need to be moved away from the work for inspection. Dwell time is reduced because grinding can be confined to the exact area to be worked on.

The discs are surfaced with Metalite, an aluminum oxide abrasive, in the standard range of grit sizes. In use, they are supported by sisal-reinforced rubber back-up pads slightly smaller than the disc.—**Behr-Manning Co., division of Norton Co.,** Tenth Ave. & 27th St., Troy, N. Y.

For More Details Circle No. 496—Page 53

STACKER CRANES are today's BIG NEWS!

- Save Man Hours
- Cut Production Costs
- Automate Handling
- Pay for themselves *FAST!*

Full Range of Capacities, Sizes and Speeds

STACKERS

- Warehousing
- Truck Loading and Unloading
- Flask Handling
- Pouring Metal
- In Process Storage
- Yard Handling (No Paving)
- X-Ray Manipulator
- Charging
- Quenching

REACH LIFT CARS

- Heat Treating
- Transfer
- Loading

TILT TABLES

SPECIAL DEVICES

STACKER CRANES and REACH LIFT CARS RATED FOR FOUNDRY DUTY
as furnished to
West Michigan Steel Foundry Co. • Muskegon

Estimates without obligation — Your inquiries invited

ALL-STATE *is the Stacker Crane* **LEADER**

ALL-STATE *Engineering Co.*, INC.
7050 North 76th Street, Milwaukee 18, Wisconsin
Telephone: Flagstone 3-8050
REPRESENTATIVES IN ALL PRINCIPAL CITIES

shell formation. The coated sand is available in several standard mixes.—**Faskure Div., Aurora Metal Co.**, 614 W. Park Ave., Aurora, Ill.

For More Details Circle No. 483—Page 53

STAINLESS STEEL ALLOY

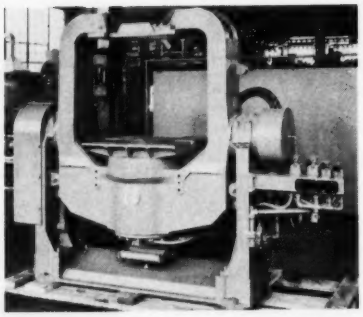
Stainless steel alloy 17-4PH is being produced to specifications that improve its reliability for investment casting applications. A proposed revision to AMS 5355, involving modifications in chemistry and comparatively high aging temperatures, has been developed by WaiMet Alloys and Armco Steel Corp. The revision has been submitted to the SAE Aero-Space Materials Div. for approval. Ten recent test heats, using metal produced to the revised specifications, indicate elongation results in the 11 to 16 per cent range.—**WaiMet Alloys**, 5320 Oakman, Dearborn 2, Mich.

For More Details Circle No. 484—Page 53

ROLLOVER DRAW MACHINE*

Jolt squeeze rollover draw machine has a jolt capacity of 1500 psi and squeeze capacity of 21,000 psi on standard 80 psi compressed air. The high squeeze pressure is achieved by using the areas of the jolt and squeeze pistons in combination. The machine has a 12 in. pattern draw and 12½ in. squeeze stroke.

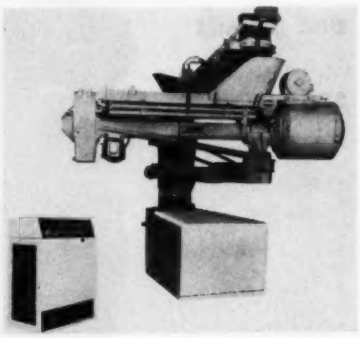
Smooth rollover action is said to be achieved by a power rollover cylinder, and a heavy duty power brake permits the operator to position the jolt table at intermediate points for easy, time saving flask loading.—**SPO Inc.**, 6449 Grand Division Ave., Cleveland 25, Ohio.



For More Details Circle No. 485—Page 53

AUTOMATIC SANDSLINGER*

Hydraulically operated Sandslinger is controlled by magnetic tape. The tape control was developed in conjunction with Micro-Path Inc., Los Angeles. The new unit, called the Autoslinger, automatically retraces the ram path on molds without the aid of cams. While the operator rams a mold in the normal manner, the ramming path is recorded automatically on magnetic tape. The tape then controls the slinger's path and provides sequencing signals for sand feed, turntable indexing, and other auxiliary operations in making subsequent molds which are duplicates of the original. Different cope and drag patterns are programmed through the use of one or more tapes.—**Beardsley & Piper, division of Pettibone Mulliken Corp.**, 2424 N. Cicero Ave., Chicago 39, Ill.



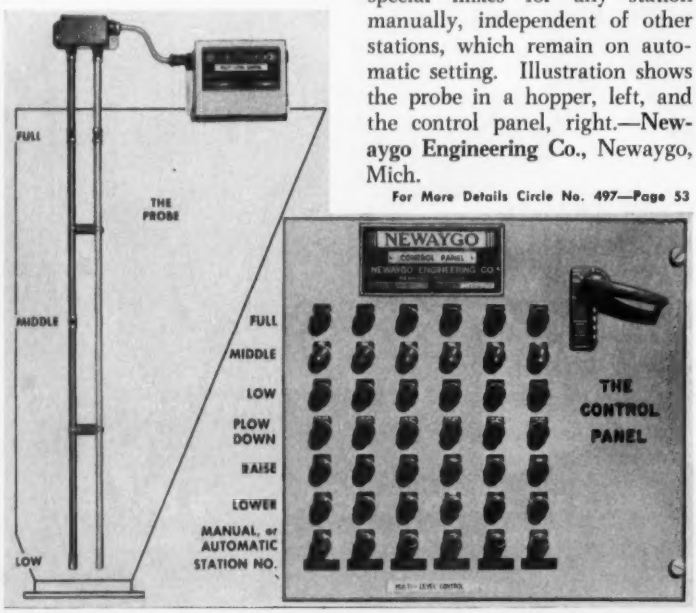
For More Details Circle No. 486—Page 53

DUST COLLECTING BENCHES

Down Draft dust collecting benches incorporate a revolving turntable to allow the operator to work all around a casting without stopping for repositioning. Bench

System Controls Level of Sand in Hopper*

A system of multilevel control, by a probe in each hopper, reports and controls three or more levels of sand automaticaly. The control operates hopper plows automatically or manually for any or all stations as required. The sand mixer operator can control special mixes for any station manually, independent of other stations, which remain on automatic setting. Illustration shows the probe in a hopper, left, and the control panel, right.—**Newaygo Engineering Co.**, Newaygo, Mich.



For More Details Circle No. 497—Page 53

POSITIVE DUPLICATION—EVERY TIME!

One animal makes tracks like these, a pattern that is positively duplicated only by the grizzly bear. And only Cincinnati offers you the Positive Duplication of these SWING FRAME WHEELS, and of *all* CINCINNATI (PD) °SNAGGING WHEELS.

HOW WE ACHIEVE "PD"

To produce wheels of unsurpassed uniformity, Cincinnati developed a unique manufacturing process. It involves 36 separate quality controls, from formula blend to final inspection. For example, cams for temperature control of drying ovens must pass regular tests for accuracy, and checking procedures never vary.

HOW UNIFORMITY HELPS YOU

One big advantage of CINCINNATI (PD) WHEELS is—longer wheel life. Using (PD) WHEELS you get costs down and *keep* them down, because each reorder wheel will act and grind exactly like the original. This is the promise—and *performance*—of Positive Duplication.

CUT COSTS . . . CALL CINCINNATI

Our factory representatives are trained specialists, experienced in snagging and grinding operations. Their skills are at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

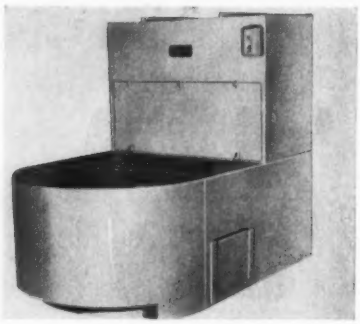
(PD) POSITIVE DUPLICATION

CINCINNATI
GRINDING WHEELS

°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Circle 651 on Page 53

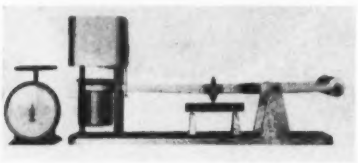


is ideal for grinding, polishing, and sanding and provides excellent dust collection through higher velocity downward streams of air—300 to 800 fpm. Heavy-duty viscous filters in the rear compartment remove dust, and an axial flow fan in the top of the compartment exhausts the air vertically inside or outside. —**Wolverine Equipment Co.**, 31 Main St., Cambridge, Mass.

For More Details Circle No. 487—Page 53

SAND TESTING*

Line of testing and sampling equipment for foundry sand and cores is said to conform to recommendations of the Committee on Foundry Sand Research of the



American Foundrymen's Society. The equipment includes testers for permeability, core hardness, and core strength, a combination rammer-compression tester, sand washers, core permeability tube, transverse test core maker, utility mixer, drying ovens, and testing sieves. Manufacturing rights to the sand control equipment were purchased from Claud S. Gordon Co.—**Tabor Mfg. Co.**, Lansdale, Pa.

For More Details Circle No. 488—Page 53

DATA COLLECTOR

Model 180 data collector automatically assembles into a punched paper tape variable data, identification data from prepunched IBM cards, fixed data, and time from an internal clock. Output rate is 15 characters per second on 5, 6, 7, or 8-level punched paper tape. Unit is modular, self-contained, and portable. It can be wall mounted or placed on a table.—**Control Data Corp.**, 501 Park Ave., Minneapolis 15, Minn.

For More Details Circle No. 489—Page 53

MOLDABLE EXOTHERMIC*

Feedex is a moldable exothermic material for maintaining metal in a liquid condition in risers. The material is used with iron, steel, copper-base alloys, aluminum and magnesium alloys. The product can be molded into any required shape, as illustrated here, when mixed with water. It is ignited by molten metal entering the riser, and burns at a uniform rate. Then the compound forms a strong, refractory lining.

The company also manufactures Logas 50, a solid, compacted briquet developed to remove dissolved hydrogen from molten copper and copper alloys, reducing gas porosity in castings. Degassing with this material requires no expensive equipment and can be accomplished directly in lift-out, tilting, or high-frequency furnaces, or in the transfer ladle.—**Foundry Services Inc.**, 20200 Sheldon Rd., Berea, Ohio.

For More Details Circle No. 490—Page 53

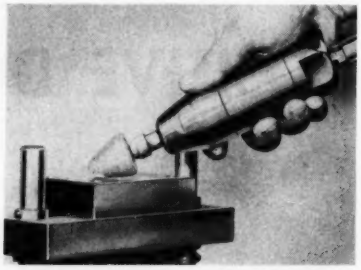
He's Got Handlebar Harry

William Phillips, foundry superintendent, Dominion Coal Co., Glace Bay, Nova Scotia, won first prize in National Engineering Co.'s $5000 contest search for Handlebar Harry. Mr. Phillips and his wife will travel to Hawaii on a ten-day all-expense-paid trip.

Handlebar Harry, the winning muller, was bought new by Dominion Coal over 40 years ago and, they say, has been used daily ever since. Now replaced by a Simpson Porto-Muller, the old-timer will be on display at the National Engineering booth at the AFS convention in Philadelphia. Other prize winners will be announced at the National booth in Convention Hall on May 11 at 11:45 a.m.

SMALL WHEEL GRINDER

Model 400-G heavy-duty, small-wheel grinder is useful particularly for metal removal in precision custom die work, patterns, castings, and in production lines where speed and versatility are important. Tool



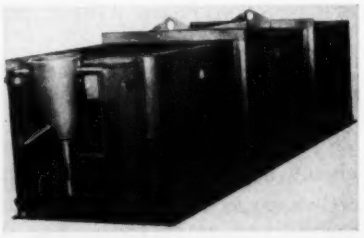
is equipped with a positive lever throttle control for speed and safety.

Grinder is powered by a ball bearing pneumatic motor operating at 19,000 rpm, weighs 1½ lb, and is 6½ in. long by 1½ in. in diam. Unit is available in either collet chuck or spindle models. **Airetool Mfg. Co.**, 302 South Center St., Springfield, Ohio.

For More Details Circle No. 491—Page 53

CENTRIFUGAL CASTER*

Trunnion type centrifugal casting machine is designed for producing tubular castings of stainless



steel, steel, iron, and bronze. Castings up to 20 ft long and weighing 30,000 lb can be made. The machines have jet water cooling, gas mold heating, electronically-controlled variable speed drive, and an adjustable support for long castings. A car-type, semiautomatic spray lance system for spraying molds is offered as accessory equipment.—**Centrifugal Casting Machine Co.**, Box 947, Tulsa, Okla.

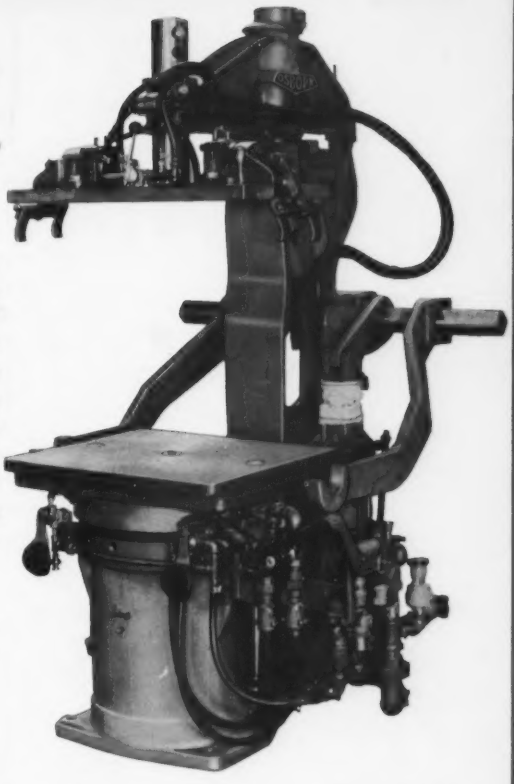
For More Details Circle No. 492—Page 53

Circle 652 on Page 53→

To mechanize match-plate molding OSBORN

ROTA-LIFT®

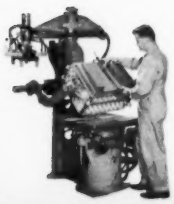
Molding Machine



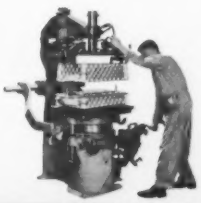
Large match-plate molding today is a one-man, one-machine operation with Osborn *Rota-Lift*. Mechanized to pay off in precision quality castings at lower cost, *Rota-Lift* easily handles all five major match-plate molding operations —jolt . . . roll . . . squeeze . . . draw . . . close. *Rota-Lift* machines handle a wide range of flask sizes . . . are quickly adjustable for rapid, short-run job changeovers in both jobbing and semi-production foundries.

Machine Number	Table Size	Squeeze Cylinder Diameter
3131	22″ x 26″	13″
3161	24″ x 27½″	16″
3191	30″ x 30″	19″

ROLLOVER arms are raised—lifting flask on split trunnions for quick, easy rollover operation.

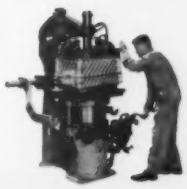


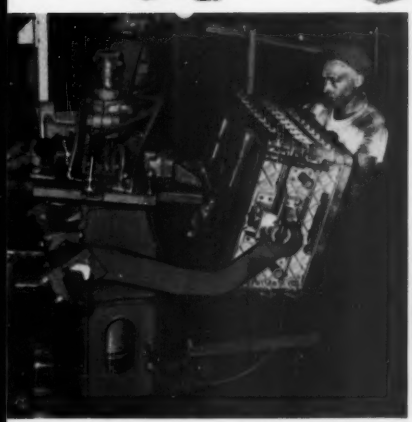
DRAWING COPE takes place on return stroke of squeeze piston. Pattern plate is vibrated during draw.



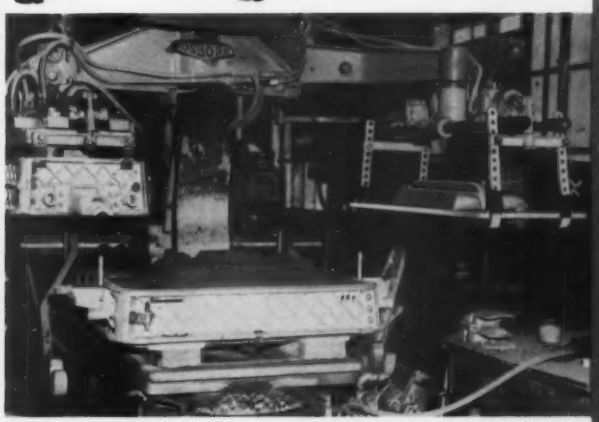
HANDLING COPE while pattern is manually drawn from drag mold. Left knee valve operates pattern plate vibrator, leaving both hands free for drawing drag pattern.

CLOSING MOLD—cope is swung into closing position and drag raised until it contacts cope. Finished mold is ready for transfer to conveyor or floor.





TAKES THE MUSCLE OUT OF MOLDING . . . because *Rota-Lift* mechanized rollover operation means match-plate molding is no longer limited by operator's ability to roll over the mold manually.

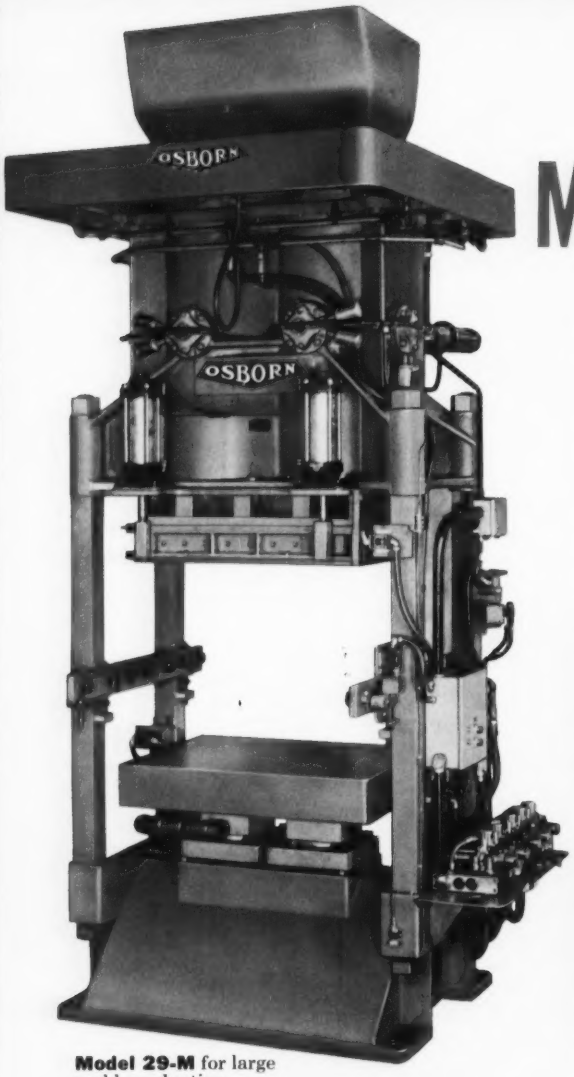


ROTA-LIFT MATCH-PLATE HANDLING DEVICE (swung out at right) has drawn pattern from drag. Cope mold is swung out at left. Drag half of mold rests on *Rota-Lift* table. Cope is now ready to be returned and mold closed. Handling Device is optional.

OSBORN advanced molding and coremaking equipment • built to bring you a bigger profit

For high production, automatic molding. OSBORN®

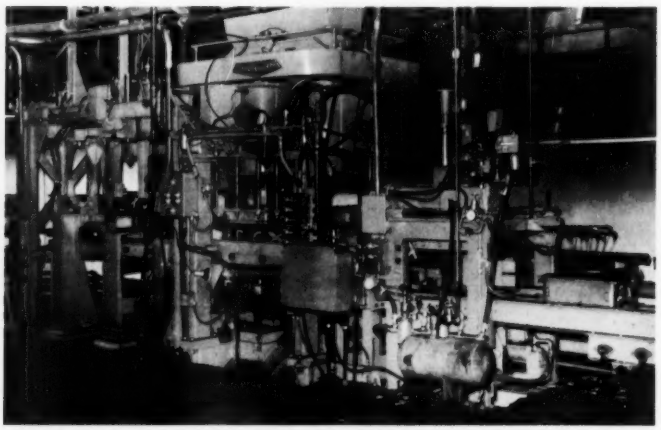
SERIES "M" MOLDING MACHINES



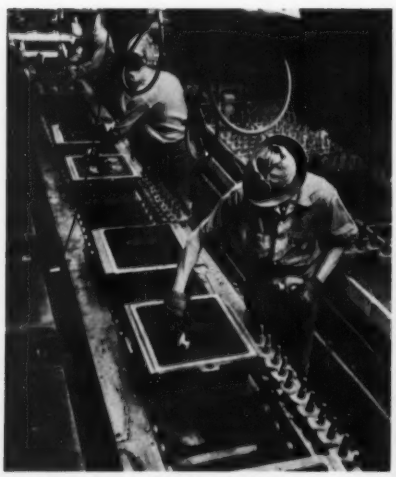
Model 29-M for large mold production.

Series "M" Molding Machines have proved their efficiency and economy in production and semi-production foundries.

These blow-fill, hydraulic-squeeze molding machines automatically blow predetermined volume of sand into molds. Design assures intimate contact between sand and pattern for superior casting finish. Adjustable high pressure hydraulic squeeze action provides controlled degree of mold hardness. Entire sequence is automatic, on preset time cycles. Green sand molds are completed within 12 seconds.

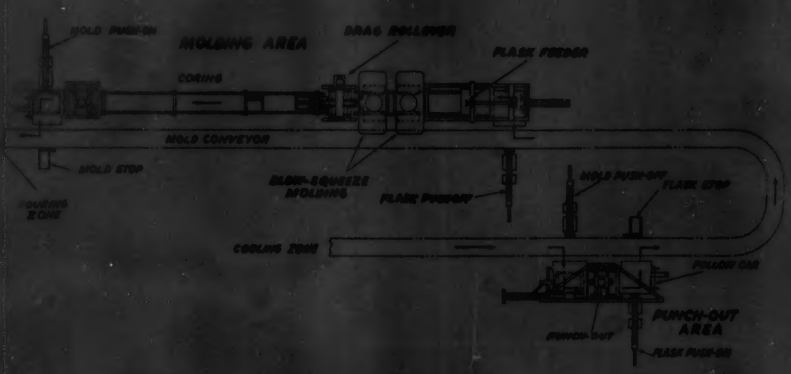


OSBORN SERIES "M" Molding Machine installation.



CORE CONVEYOR LINE is part of this efficient Osborn automatic molding line setup.

SCHEMATIC FLOOR LAYOUT... typical Osborn automatic molding line for reliable production at low cost—incorporating Series "M" Molding Machines and automatic mold and flask handling equipment.

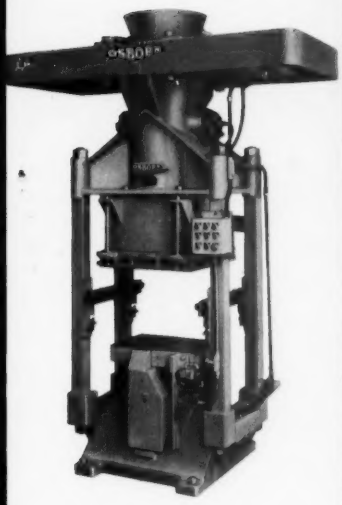


For low-cost, high-quality cores

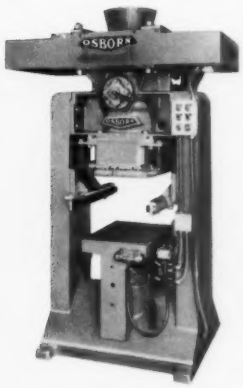
OSBORN®

JET-CORE.

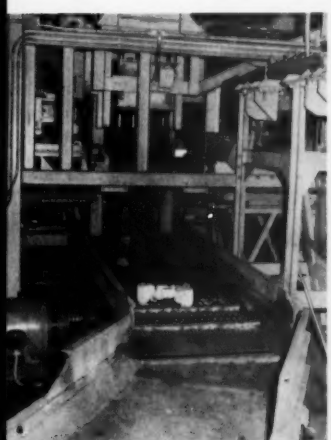
Automatic Core Blower



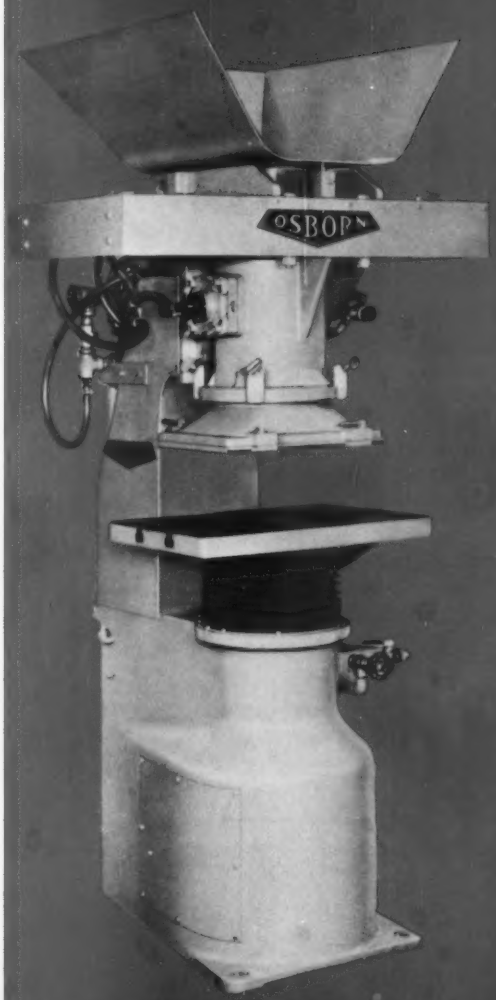
Model 19-M-2 is engineered to produce medium-size molds.



Model 19-M for production of small, superior quality molds.



CASTING PUNCHOUT quickly removes sand and castings . . . brushes flask walls clean . . . and eliminates practically all flask pin and bushing maintenance.



Designed for the production, semi-production and jobbing foundry—Osborn *Jet-Core* units produce superior quality cores at extremely low cost . . . automatically . . . at high production rates . . . with standard production sand.

Jet-Core features include push-button operation, high speed cycle time, improved jet blow action and choice of quick-change blow heads. Blow head is stationary . . . no reservoir movement for filling. Core-blower table on this compact unit quickly adjusts and locks hydraulically. Double blow-plate feature for wooden boxes is also available.

Machine Number	Approximate Capacity (Core)	Clamp Cylinder Diameter
910	25 lb.	10"
916	75 lb.	16"

MODEL 910 JET-CORE shown here produces cores 2" x 4" to 10" x 15" and up to 8" deep. Handles box sizes 4" x 6" to 12" x 17" wood or metal, split or dump types.

WIDE RANGE OF CORES all easily and rapidly blown on Osborn *Jet-Core* equipment.

For rugged, flexible precision molding OSBORN

INTERCHANGEABLE RAMS offer high degree of versatility for foundry molding operations.

VIBRATING SQUEEZE STRIPPERS and JOLT SQUEEZE STRIPPERS

This line of Osborn foundry equipment provides a choice of features and capacities to handle a wide range of molding requirements. In addition to choice of vibrating-ram or jolt-ram actions—all models offer optional roll-on, roll-off stripping rails . . . simultaneous cope and drag . . . simple, automatic control panel . . . and powered squeeze head.

Cushioned, oil-controlled pattern draw is adjustable for both length and speed. Pattern vibrator control is automatically synchronized with draw mechanism. Adjustable lift pins accommodate a wide range of flask shapes and sizes.

Machine Number	Table Size	Squeeze Cylinder Diameter
712PJ or PV	18″ x 28″	12″
714PJ or PV	20″ x 31″	14″
716PJ or PV	22″ x 34″	16″
719PJ or PV	23″ x 38″	19″
721PJ or PV	30″ x 42″	21″

OSBORN 712PJ machine with lifting pin strip.

OSBORN 716 PVA Automatic Vibrating Squeeze Pin Lift molding machine . . . shown at completion of cycle. Cope and drag halves are stripped automatically. Operator removes cope, places it over cored drag from previous cycle.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue • Cleveland 14, Ohio
leader in mechanization for the foundry

OSBORN

MOLDING MACHINES • CORE BLOWERS • METAL FINISHING MACHINES . . . and FINISHING METHODS • INDUSTRIAL BRUSHES

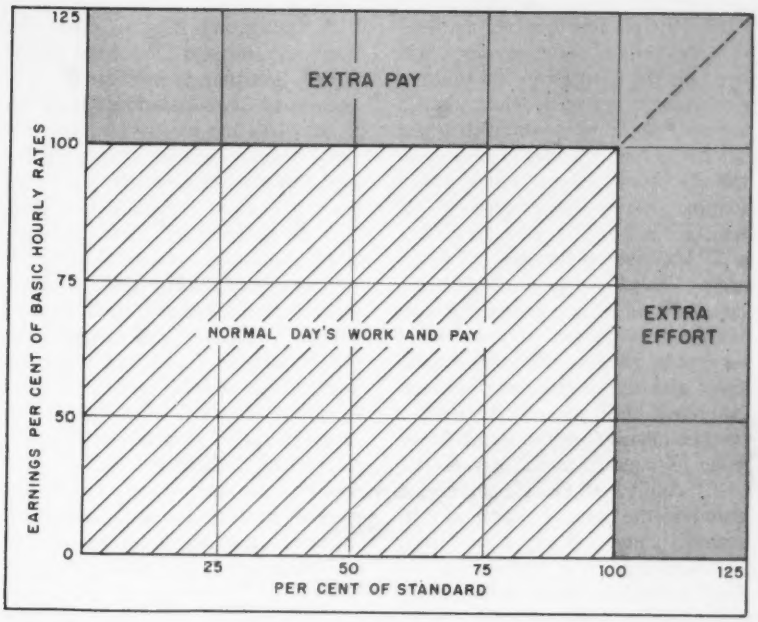


Fig. 1—Standard hour "one-for-one" wage incentive plan rewards a worker in direct proportion to productivity above the standard

How To Revise Outmoded

CLEANING ROOM INCENTIVE PLANS

By JOHN R. WALLEY
Walley & Associates
Dayton, Ohio

● CLEANING ROOM incentive plans create many problems, especially for a company with a tonnage bonus plan for cleaning castings.

Wage incentive plans using tonnage as a basis—that is, paying a bonus for cleaning more tons of castings per hours worked than the average for a period in the past—are simple to develop and install. The installation cost is negligible and—for a while, at least—workers clean more castings per hour worked.

Sooner or later, however, troubles develop. They usually take one of the following forms:

1. Excessive cleaning room labor costs.

2. Grievances when earnings are low and much work must be done to clean many lightweight castings.

3. Pegged production when many heavy castings are cleaned and high incentive earnings follow.

4. Difficulties when attempts are made to change the standard after new equipment or methods have been introduced.

Why Tonnage Plans Fail—First, excessive cleaning room costs develop because of the use of historical information (hours worked and tons of castings cleaned) in establishing the incentive standard.

Time study engineers report that few cleaning room workers perform at 60 per cent of a normal day's activity against time-study standards before incentives are installed. Therefore, it is easy for the men to increase output tremendously—even up to 200 or 300 per cent—with little effort. If a bonus is paid, it is readily understandable that cleaning room labor costs skyrocket under this type of plan.

Second, grievances increase when earnings are low. Generally workers must clean a great number of small, lightweight castings, producing little tonnage. As a result, incentive earnings disappear, and management is urged to pay average earnings to the workers. When management gives in on this point, it signs a death warrant for the wage incentive plan. Payment of past average earnings is not practicable with a well administered, correctly installed wage incentive plan.

Third, pegged production results when a long run of heavy castings is scheduled through the cleaning room. Workers know that earnings will rise sharply and hold back effort so that management does not become deeply concerned over the payment of high bonuses. Production schedules are, of course, disrupted.

Fourth, difficulties arise when attempts are made to change the standard after new equipment or

TABLE I—Proportionate Reduction in Man-hours per Ton Task

—A— Manhours Per Ton Allowed in Tonnage Bonus Plan	—B— Present Occupations in Cleaning Room	—C— Distribution of Hours Worked, Per Cent	—D— Hours To Be Removed from Tonnage Bonus Manhours/Ton (C x A)	—E— Sequence of Introducing New Standards	—F— Temporary Tonnage Bonus Figure Until New Standards Are Installed (A—D)
30.00	Stand Grinders	15	4.5	1	25.5
	Chippers	30	9.0	2	16.5
	Burners	5	1.5	3	15.0
	Materials Handlers	20	6.0	4	9.0
	Welders	10	3.0	5	6.0
	Heat Treater	20	6.0	6	NONE
		100	30.0		

methods are introduced. It is practically impossible to measure the effect of each improvement and reduce the tonnage bonus standard by a proportionate amount. As a result, the standard is untouched and, over a period of time, the standard becomes so relaxed that workers earn a bonus by cleaning relatively few castings.

These problems are serious in the day-to-day operation of a foundry cleaning room, and there is no easy solution. Once workers have been earning incentive pay, it is not easily taken away.

Develop Simple Principles — To avoid the problems involved in tonnage cleaning room bonus plans, develop first a set of simple principles. Such guideposts are required for the development of any wage incentive plan in the foundry, whether it covers melting, molding, coremaking, sand mixing or cleaning room operations. The principles are as follows:

1. Make sure that the worker is using the best method known when his standard is being established. This principle does not imply a need to wait until a perfect method has been developed before a standard is established. It does mean that a method should be used which is not subject to immediate change as soon as the worker learns how many castings are to be cleaned in an hour.

2. Use job evaluation to determine a fair base rate for each occupation in the cleaning room. When base rates are established equitably, in line with job conditions and responsibilities, the company will be in a position to pay a worker fairly when he is off standard.

3. Apply all work standards through the use of standard elemental data. Companies using standard elemental data, developed from grouping many time studies and applying the same time values when work elements repeat, have fewer grievances over standards. The use of standard elemental data provides for consistent work standards and opportunity for fair earnings at all times.

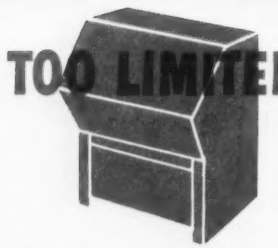
A Satisfactory Plan — Once the guiding principles have been established, it is time to consider the elements of a satisfactory cleaning room incentive plan—one that will cut costs, increase productivity, and reward workers with extra pay for extra effort. Such a system is the standard hour "one-for-one" wage incentive plan. The term "one-for-one" means that payment of incentive earnings is in direct proportion to percentage of hours produced after the standard has been reached, as shown in Fig. 1.

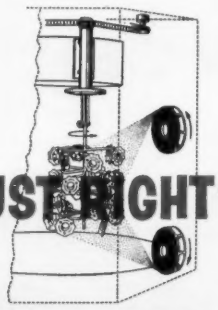
In the standard hour one-for-one wage incentive plan, all work standards are established after time studies have been taken and are expressed in hours per casting cleaned. Some of the benefits from use of the standard hour plan are as follows:

1. Standards are expressed in hours, which are easily understood by all concerned.

2. Standard hours can be used as the basis for managerial controls such as variable budgets for operating expenses, production schedules,

EXECUTIVE REPORT #13





One blast machine can bridge this gap

Castings that are not best suited for cleaning in batch type blast mills, yet whose volume does not warrant installation of continuous, high speed equipment, can be blast cleaned with superior results in a Wheelabrator Spinner-Hanger Cabinet. These versatile cabinets can be designed to meet individual requirements of part size, number of compartments and blast wheels, and design of work-carrying fixture, offering efficiency and economy in cleaning limited runs of a wide variety of parts.

Spinner-Hanger Cabinets can answer your problem of rising operating costs.

Wheelabrator spinner-hanger cabinets clean "problem" parts as effectively as monorail cabinets, but at a fraction of the equipment cost. For specific cost-saving ideas, write to Wheelabrator Corporation, 505 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ontario.

and measurement of effectiveness of departmental or plant management.

3. Direct-labor cost estimates can be prepared quickly and accurately by using the same time data applied when castings are cleaned.

4. Workers can know in advance the time allowed for cleaning any casting.

5. Standard elemental data, based on time study, provide for quick, correct establishment of fair and consistent production standards. Workers will have equal earning opportunity on all castings, regardless of weight or difficulty of cleaning.

6. For the most part, individual incentives are applied. Where groups must be established because more than one worker is required to clean a casting, standards are based on time study with earnings dependent on the group results.

7. Calculation of incentive earnings is done easily by any worker.

Changeover Problems — Many problems are involved in changing over from a tonnage-bonus plan to one of time study set standards. In fact, many managers would rather live with an outdated, runaway type of tonnage plan than attempt the change. The principal problems are these:

1. What is to be done about incentive earnings during the transition period between removal of the old plan and installation of the new?

2. What is the best way to remove sections of the old tonnage plan covering all employees and install individual measurement over separate employees?

3. What is to be done about employees who cannot earn their basic hourly rate under individual incentives?

For each company and its employees, a different approach and settlement may be necessary. The earnings problem is the toughest of all. Employees who have not had to work hard to earn a bonus under a tonnage plan usually find that considerably more effort is required to earn the same hourly take-home under the new standards. Management should not expect to solve this problem easily. It is solved through negotiation.

Accurate history must be developed on each employee in the cleaning room. This should cover 1) past average earnings for at least a three-month period prior to introduction of new standards and 2) percentage of efficiency shown by the employee during the same period, as measured by his performance against the new standards.

The solution to the earnings problem in transition between the old and the new incentive plans is agreement on what the employee will be paid for reaching an efficiency level management feels is worth the amount earned before installation of the new plan and on the period of time during which management can afford to pay higher incentive earnings than deserved. Although a painful, highly controversial subject requiring extreme patience, it presents a problem that must be solved before the incentive plan revision is started. Probably no two solutions will be alike.

As new standards are developed

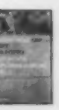
EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

Look for the hidden value in blast cleaning abrasives, too

The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to **Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P.O. Box 490, Scarborough, Ontario.**



WHEELABRATOR
STEEL ABRASIVES

**If you examine it closely enough, you'll find 97 triangles.*

for each section of the cleaning room, these standards should be installed. At the same time, the old tonnage-bonus figure of manhours per ton cleaned must be reduced in proportion to the manhours taken out of the group. (see Table I.)

Admittedly, this method does not always reduce the tonnage manhour figure by the correct amount. Hours worked on a particular occupation affected currently may not have been worked in the same proportion when the original standard was established. When basic information is not available (and it seldom is), no alternative exists but to reduce the manhour-per-ton figure in proportion to the hours removed for coverage under the new incentive plan. This is the problem that plagues all users of tonnage-bonus plans each time a method is improved, new equipment installed, or layout changed.

The third major problem is to agree on action to be taken when and if employees do not reach 100 per cent of the new standards because they are unwilling to try. Employees who simply do not have the qualifications or ability either should be trained or placed on a more suitable job.

TABLE II—Nine-Step Procedure to Insure Employees Being Given a Fair Chance to Remedy Sub Standard Performance

Step	Description	Days After Introduction of New Standards
1	Put new standards into effect....	
2	Review productivity of each employee	5
3	Verbal warning and 10-day probation given employees not earning basic hourly rate	6
4	Written reprimand and 5-day warning given employees who are not earning basic hourly rate..	16
5	A three-day disciplinary layoff given employees who fail to earn basic hourly rate	21
6	A thirty-day disciplinary layoff given employees who fail to earn basic hourly rate	24
7	Upon return to work, employee is placed in next vacant position to which he is entitled by his seniority—except he shall not be placed back on the job where he failed to earn minimum rate ..	54
8	Follow same procedure on new position to step (5)	75
9	If after trying out two positions and the employee is unable to earn basic hourly rate, his employment with the company shall be terminated	

The employee who does not try to reach standard is not producing a day's work. When a concept of the normal day's work has been determined and the standard established correctly, every employee should be able to reach a minimum of 100 per cent of standard. The employee who refuses to try should be disciplined according to procedures established and agreed on before installation of the new standards. (See Table II.)

General principles to be followed in revising the tonnage plan, leading to installation of the standard hour one-for-one incentive plan, should include these steps:

1. Instruct employees in advance why the tonnage plan must be replaced and work out an agreement in writing to cover the steps involved in the changeover.

2. Explain the proposed incentive plan in detail and in writing.

3. Establish firm policies regarding a) employees who do not earn comparable amounts for the same productivity under the two methods of payment; b) amounts to be deducted as each class of workers is taken out of the group and paid on the new basis; and c) employees who refuse to produce the normal

EXECUTIVE REPORT #19

TOUGH CLEANING JOBS

call for the mighty SUPER TUMBLAST

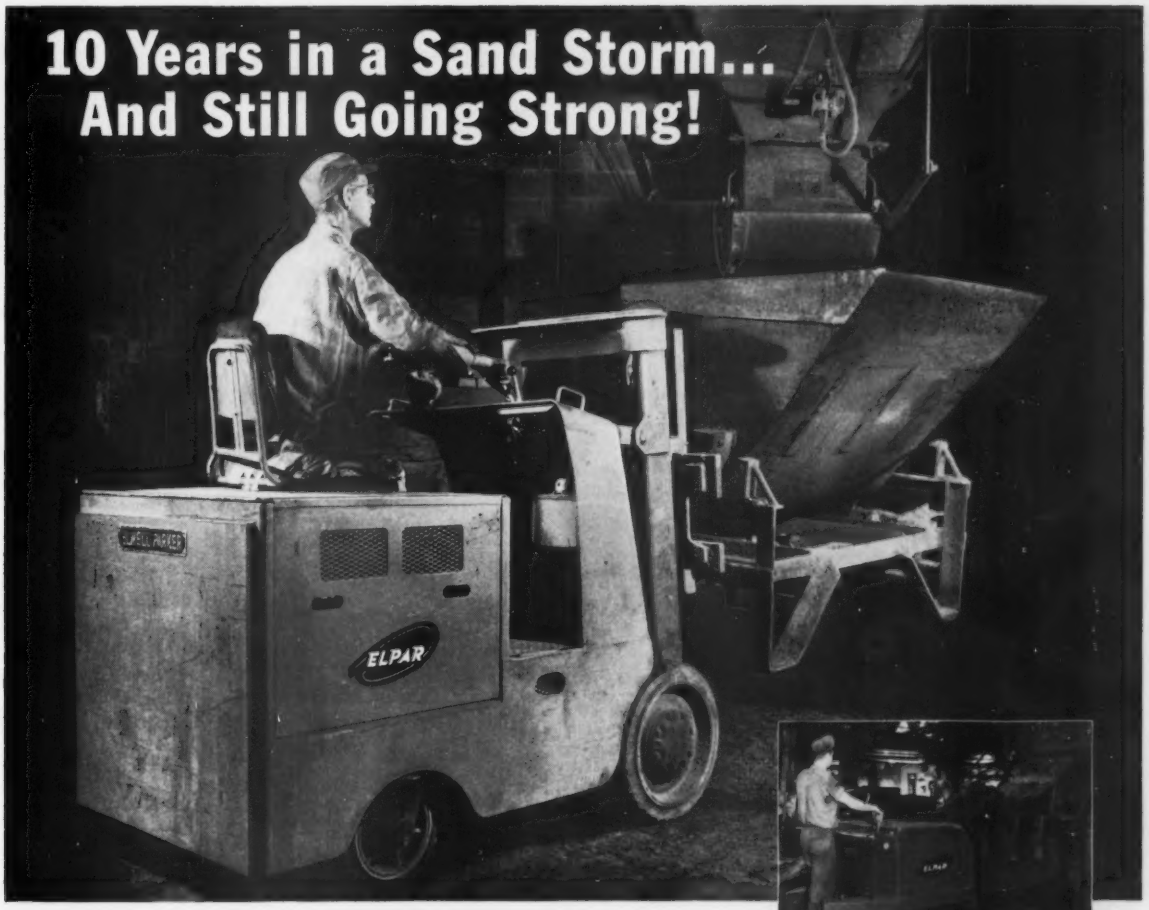
With tireless cleaning power and super performance features, the Wheelabrator Super Tumblast gives you the ultimate in cleaning efficiency and production capacity. It's engineered throughout as a *heavy duty* batch type airless blast mill, to handle the rough and tough cleaning jobs, clean efficiently, save abrasive, give maximum parts wear, and go easy on maintenance costs.

Super Tumblast performance is proven in nearly 200 successful installations

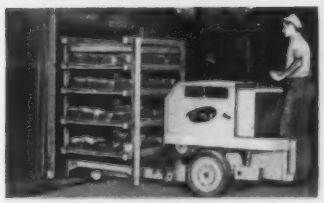
The Super Tumblast has demonstrated its ability to handle the really tough cleaning jobs, deliver high production, superior cleaning results, exceptional labor savings and unequalled economy. Get all the facts from Wheelabrator Corporation, 505 S. Byrkit St., Mishawaka, Ind. In Canada, P.O. Box 490, Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

10 Years in a Sand Storm... And Still Going Strong!



Core Sand



Green Cores

Finished Castings

ELPAR-
1st Choice in Foundries

Top quality equipment always pays off on the rough handling jobs. That's why foundries make ELPAR heavy duty electrics their first choice.

They are built to take the heavy overloads, abrasive sand and rough floors that are part of foundry handling operations. Yet, cost records prove they are far more dependable, cost less to maintain and have longer service life.

You might expect ELPAR trucks to cost more because they are the very best. But that's not true! Get a competitive quote and prove to yourself that ELPAR trucks actually cost less to buy!

Write for Special Booklet
—ELPAR Trucks For The Foundry Industry

ELPAR

ELECTRIC TRUCKS

THE ELWELL-PARKER ELECTRIC COMPANY
4312 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
In Canada: International Equipment Company, Ltd.

DOUBLE THE LIFE...ONE THIRD THE OPERATING COST

Circle 656 on Page 53

for the really tough jobs . . . both rough and finish . . . specify

AIRETOOL

JOB-FITTED PNEUMATIC GRINDERS

Airetool job-fitted grinders do both rough and finish grinding jobs faster, at lower cost and with greater output per man hour. Compact and lightweight for easy one man operation with no fatigue.

Two models in vertical grinders, 600V and 700V, operate at 4500, 6000 and 8000 rpm using 6-inch abrasive wheel and 7-, 8- and 9-inch disc wheels.

Airetool also makes two models, 600 and 700, of horizontal grinders operating at 4500, 6000 and 9000 rpm and using 4-, 6-, and 8-inch wheels.

Whatever the grinding job, there's an Airetool pneumatic grinder to do it better. For further information, write for Bulletin 67.

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

Branch Offices: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge
Representatives in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii
Canadian Plant: 37 Spalding Dr., Brantford, Ontario
European Plant: Vlaardingen, The Netherlands

Circle 745 on Page 53

day's work as agreed on.

4. Provide training for employees and foremen on such general subjects as a) method of taking time studies and establishing standards; b) performance leveling required to maintain the agreed concept of normal; c) operation of the incentive plan; d) administrative policies when conditions require a change in performance standards; and e) grievance procedure in event of dispute over standards.

5. Time study all operations in the cleaning room, starting on jobs involving the largest number of employees.

6. Make certain that the worker uses correct methods when his operation is time studied.

7. Develop standard elemental data from time studies so as to set consistent work standards.

8. Use job evaluation to determine a fair basic hourly rate, in line with community, industry, and plant earnings, which is to be guaranteed the worker for each hour he works at his job. If he is removed from his incentive job to train a new employee or perform experimental work, he should be paid a percentage in excess of his regular hourly rate.

9. Install the new standards on one occupation at a time so that the tonnage standard can be reduced proportionately and initial complaints or grievances settled quickly.

No two wage incentive plan revisions develop alike. The step-by-step procedure must be determined by a study of existing conditions. The tonnage-wage incentive plan in the cleaning room can be replaced, however, to benefit both worker and management by proper planning, written procedures and policies, and a concept of the normal day's work. The latter must be agreed on and maintained consistently through continuous education of both workers and supervision.

Renames Canadian Operation

Timken Roller Bearing Co.'s manufacturing operations at St. Thomas, Ontario, Canada, have been renamed Canadian Timken, division of the Timken Roller Bearing Co.

STEEL ★ FOUNDRY ★ PRACTICE ★

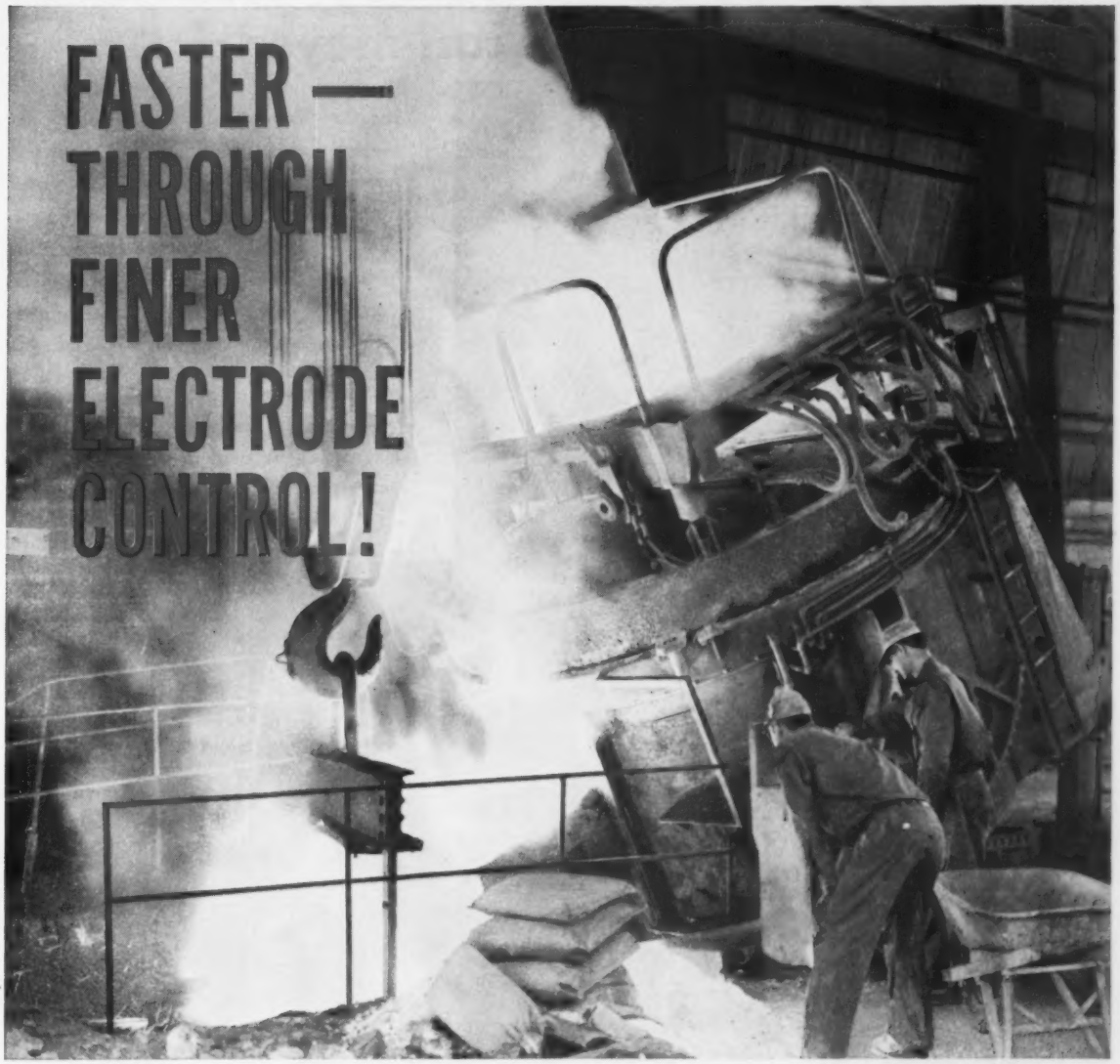
By John Howe Hall

496 pages, 252 charts and illustrations
PRICE $12.00 Postpaid

A comprehensive sourcebook covering all phases of modern steel foundry practice. Contains practical information on almost every production problem steel foundrymen encounter. Steel foundry personnel (from top executives to apprentices), educational institutions, technical libraries, suppliers to the steel foundry industry . . . all will benefit from the use of this book.

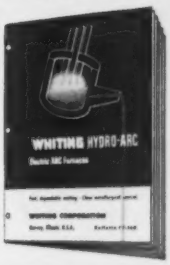
FOUNDRY
BOOK DEPT.
1213 W. 3RD ST.
CLEVELAND 13, O.

FLORIDA STEEL CORP., TAMPA, SELECTS HYDRO-ARC ELECTRIC FURNACE FOR FLORIDA'S FIRST STEEL MILL!



Hydro-Arc electric furnaces, from Whiting, give you full-time arc efficiency, faster heats, more wattage turned into melt, lower electrode consumption, virtually no electrode breakage. Arc adjustment is instantaneous. Mechanical lag? Almost totally eliminated by non-stop, non-reversing electrode motors plus vital air counter-balance. Here's Whiting's new concept in low-cost electric melting—new, yet fully proven for your benefit in steel mill after steel mill. Look into Hydro-Arc now!

Get Details in Hydro-Arc Catalog No. FY-168, or ask a Whiting furnace engineer to call. No obligation. *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.*



See Our Catalog in SWEET'S

FEMA

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

ELECTRIC FURNACES

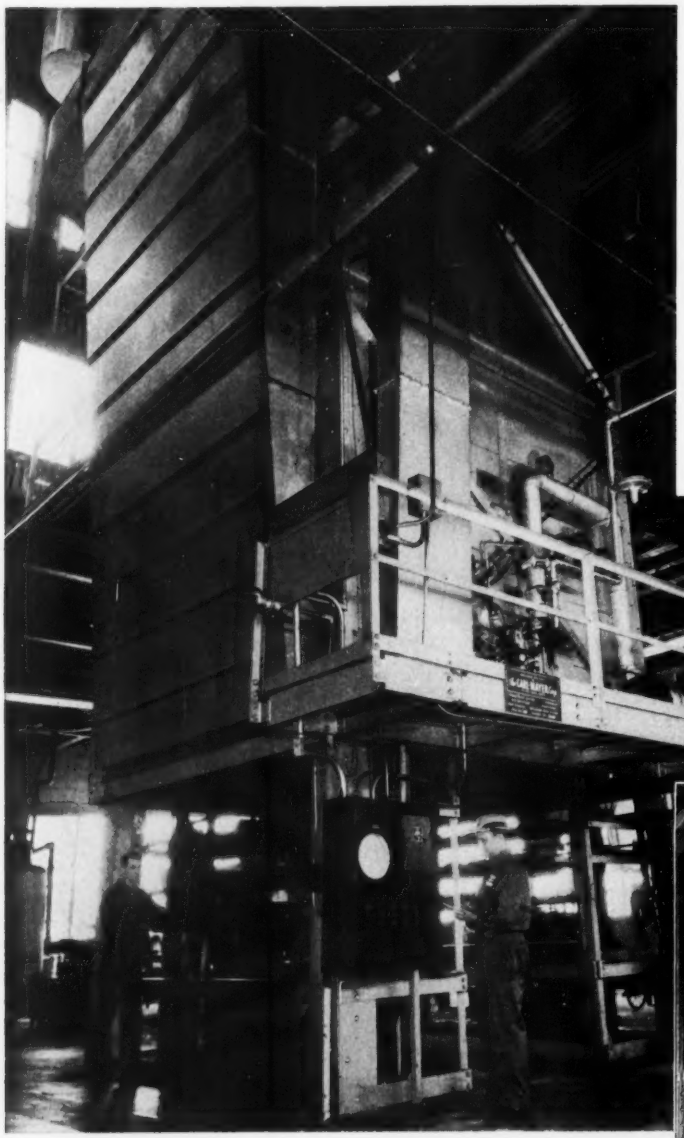
WHITING

MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES®; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

Circle 658 on Page 53

Foundry-Proven Money Makers!

Ovens Designed by carl mayer CORP.



The Carl Mayer Corp. experience in engineering and designing industrial ovens and furnaces is second to none! Carl Mayer ovens incorporate recirculating heating systems with sealed combustion chambers and automatic temperature controls for all fuels. Cores and molds are evenly baked faster, with less fuel consumption.

Many foundries of all sizes have found it pays to install Carl Mayer ovens—Our engineers will be glad to work with you on your oven problems. Write or call now!

A NEW VERTICAL CORE OVEN Installed at Forest City Foundry, Cleveland, Ohio. Size is 12' 7" x 11' 10" x 57' 8" high above floor. 29 carriers, 3 shelves high; each shelf 30 x 106 inches. Features forced cooling and exhaust system for uniform cooling of cores before unloading.

CAR TYPE MOLD OVEN at American Brake Shoe Co. features under floor chain car puller. Size 10' x 10' x 19' long.

THE carl mayer CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Industry Briefs

Inductotherm Linemelt Corp., 412 Illinois Ave., Delanco, N. J., has been formed to manufacture a complete line of core-type induction melting equipment. The firm also will handle Swiss-made Brown Boveri coreless low-frequency melting furnaces in the USA. Officers are J. Lloyd Hoff, president, and Alfred A. Coley, vice president. Although a separate corporation, the new organization is associated with Inductotherm Corp., same address, manufacturer of medium-frequency induction heating and melting equipment.

J. W. Hamblen Co., foundry consultant and manufacturers representative, has been formed by James W. Hamblen at 2010 Washington Rd., Kenosha, Wis. The company will operate on a nationwide basis and will represent Hansberg Inc. in Wisconsin, Illinois, Minnesota, and Iowa. Mr. Hamblen formerly was a metallurgical consultant with Cardox Div., Chemetron Corp., Chicago.

Pangborn Corp. plans to operate its fleet of three passenger planes between Philadelphia and Hagerstown, Md., during the AFS Foundry Congress. The service will give Congress visitors an opportunity to inspect the company's plant and types of machinery not included in the Pangborn exhibit at the Foundry Show.

A. O. Smith Co.'s foundry, Huntington Park, Calif., has been purchased by Ampco Metal Inc., Milwaukee, producer of bronze alloys. The Smith foundry will provide 50 per cent greater floor space than Ampco's former West Coast plant at Burbank, which is being sold. Ampco plans to construct a new office building in Huntington Park.

Air Reduction Sales Co., division of Air Reduction Co., New York, has opened a new liquid air separation plant at Fairfield, Alabama. The $30 million plant will produce more than 30 tons of liquid oxygen, nitrogen, and argon daily. Another plant is being built at Fairfield and is to be completed next fall.

True-Cast Industries has been established in a one-story brick building at 154 E. Patterson St., Alliance, Ohio. John Palermo is owner of the business, which employs six to eight people. An expansion is planned.

Sight Feed Generator Co., West Alexandria, Ohio, has changed its name to Rexarc Inc., to include additional lines of products developed by the company. Sight Feed Generator Co. will be referred to as a division of Rexarc Inc.

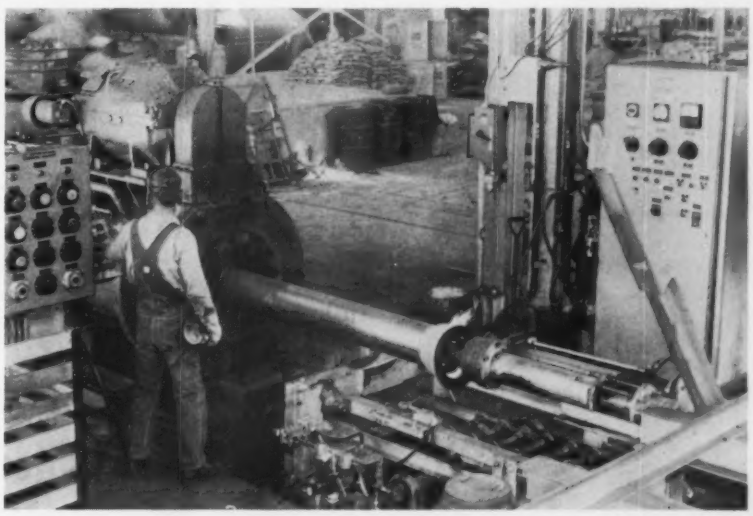
Duraloy Co., Scottdale, Pa., has purchased Walmil Co., Pleasant Ridge, Mich., fabricator of high-alloy fixtures. Walmil will be operated as a division of Duraloy, and no changes in management or production at the division are anticipated.

Marathon, division of American Can Co., is installing a 100,000 lb per day spray dryer and other processing equipment to produce lignosulfonates from spent sulfite liquor at its Green Bay, Wis., pulp and paper mill. Lignosulfonates are used for many industrial purposes, including in foundry binders.

Osborn Mfg. Co., Cleveland, has appointed Ray F. Frings, 1247 American Life Bldg., Birmingham 3, Ala., as a sales and service representative for its molding machine division. Mr. Frings will serve Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. C. Eugene Silver, 2622 Riverside Dr., Houston 4, Tex., has been named Osborn's sales and service representative in Texas and Louisiana.

Dependable Shell Core Machines Inc., Portland, Oreg., has named Foundry Core Supply Co., 4045 Ashland St., Philadelphia 24, Pa., as its East Coast distributor.

Z & H Mfg. Co. has moved to new quarters at 1000 N. Division St., Peekskill, N. Y. The move will triple the company's investment



PIPE PLANT: A hot length of cast iron pressure pipe is pulled from one of three centrifugal casting machines at Griffin Wheel Co.'s new pipe plant in Council Bluffs, Iowa. By pressing three buttons on an electronic control panel, one man can turn out a 20-ft length of pipe, extract it from one of these machines, and send it into the plant's two-story high annealing furnace

Even the smallest-size Heroults have big electric furnace features!

Now, while you've got time to catch your breath, is a good time to take a searching look at your foundry facilities. In the face of the obviously keener competitive period ahead, wouldn't you be smart to modernize your melting equipment—to switch to electric furnaces—and be ready for the business upturn that's coming? *You can install a Heroult now with minimum inconvenience to plant operations.*

The Heroult Electric Furnace helps you produce better-quality steel . . . faster . . . and more economically

Available in standard sizes of shell diameter ranging from 7′0″ on up, and with capacities of from 1½ tons up to 200 tons, the improved Heroult is unquestionably the finest electric melting furnace on the market. The features listed below are found in all standard Heroult's—even the smallest.

The Heroult Furnace is 100% mechanically operated.

It includes such mechanical features as: heavy rack-and-pinion-type tilting mechanism; mechanical roof lift; motor-driven, rotating, jib-type roof swing; winch-operated, water-cooled jib-type door-lifting mechanism; and high-speed, electro-mechanical electrode-positioning mechanism.

Another exclusive—cage-type shell construction with shell plates clipped to a heavy supporting structure. This construction minimizes shell warping and allows easy replacement if shell plates are damaged.

Exclusive—Operating Mechanism Independently Supported.

The tilting platform on which all operating mechanisms are supported is attached directly to the rockers independent of the shell structure. Thus operating mechanisms are unaffected by any shell distortion.

Exclusive—Flat-Bottom Shell.

This feature facilitates easy shell relining and provides maximum protection against burnouts. Thicker refractory at the sides of the hearth promotes more uniform bath temperature.

Exclusive—Water-Cooled, Skew-Back Roof Ring.

This feature eliminates the need for special skew-shaped roof refractories.

Electrode Mast Safety Device.

This spring-loaded, rack-and-pawl-type device provides positive protection against damage resulting from electrode-winch cable breakage.

Square-Sectioned, Water-Cooled Electrode Mast Arms.

This design guarantees a rigid connection between mast and mast arm, thus helping to maintain proper electrode position and alignment.

Remote-Controlled Electrode Clamps.

This device, of the spring-clamp, air-release type, is located inside of the rear section of the water-cooled mast arm where heat cannot affect it.

Square-Sectioned Electrode Mast.

This design feature, developed by American Bridge, assures proper guiding and electrode positioning.

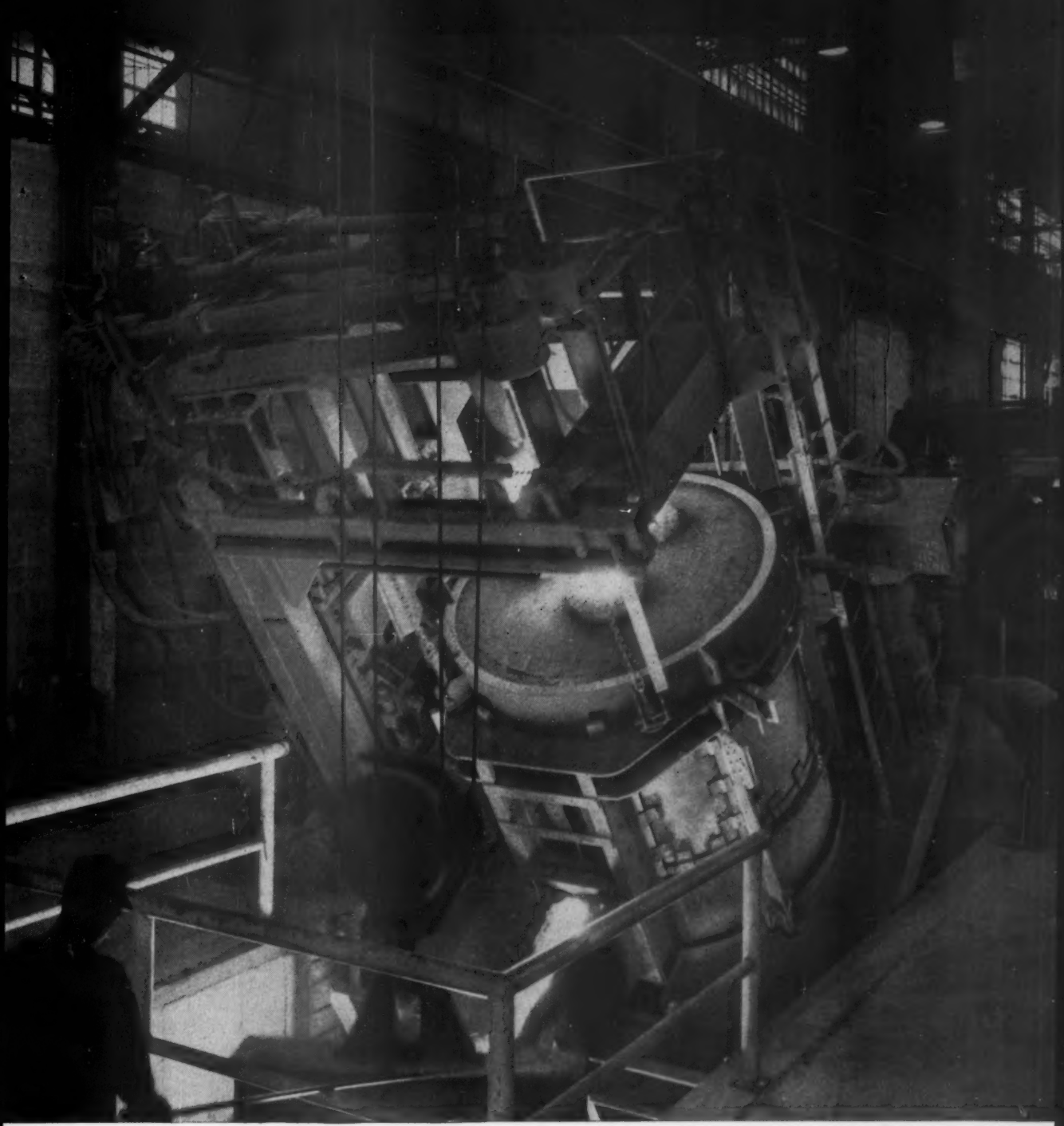
Rockers.

The heavy fabricated steel curved top and bottom rockers minimize forward travel during tilting. The furnace will return to charge position from any degree of tilt due to designed center of gravity.

USS, American and Heroult are registered trademarks

American Bridge Division of USS United States Steel

General Offices: 525 William Penn Place, Pittsburgh, Pa.
Contracting Offices in: New York, Philadelphia, Chicago, San Francisco, Harrisburg, Pa. and other principal cities
United States Steel Export Company, New York



7′ dia., 1½–ton Heroult in a leading midwest foundry.

Should You Put in an Electric?
Our 32-Page Catalog
Tells You Where and When!

Send for our free Heroult catalog for comprehensive information on the advantages of electric melting. Contains charts and tables; gives sizes, capacities, and ratings. Helps you determine how the Heroult can improve your operation. Just contact the nearest office or write direct to Pittsburgh.

Circle 660 on Page 53

American Bridge Division
525 William Penn Place, Dept. F-49
Pittsburgh 30, Pa.

Please send me a copy of the latest Heroult Electric Furnace catalog ☐ and/or folder showing standard Heroult design features ☐.

Name ..... **Title** .....

Firm Name .....

Address .....

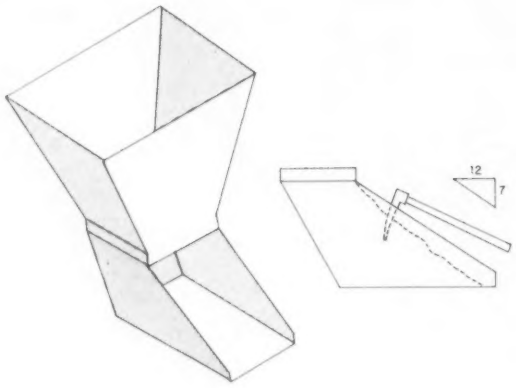
City ..... **State** .....

HOW To Do It

FOUNDRY will pay a minimum of $15 for each "How To Do It" idea submitted and published

Hopper Bottom Keeps Sand Off Floor

By H. B. DIETER
D & H Foundry
Austin, Texas



A HOPPER BOTTOM sand shelf is not as rapid or as efficient as a genuine molder's hopper door, but it is rugged and dependable, requires no lubrication or maintenance, and has no moving parts. It is satisfactory for applications where sand can be supplied from overhead, but where the expense of more elaborate equipment is not justified. The shelf is made of $\frac{1}{8}$-in. steel plate, and the dimensions shown are correct to allow prepared molding sand or core sand to remain on the shelf without falling until raked out with a short handled hoe into a flask or corebox.

casting capacity and provide improved facilities for secondary machining operations, heat treating, and liquid honing. The engineering department also will be enlarged.

Bethlehem Foundry & Machine Co. has organized an Environmental Engineering Division, to offer services and products to companies in the electronics and missile fields. Facilities of the division include a foundry and plate fabrication and machine shops. Bernard Friedman is division manager.

Hauck Mfg. Co., Brooklyn, N. Y., has appointed two new sales agents, Sooner Distributors Inc., Tulsa, Okla., and Delta Instrument Co., El Paso, Tex.

Nashville Bronze Inc., 2720 Nolensville Rd., Nashville, Tenn., has opened a foundry to make bronze cemetery markers. Eighteen to thirty people are employed in the foundry. Manager is T. C. Doak.

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., has changed the names of three of its sales subsidiaries, Mexico Refractories Co. of Ohio (Cleveland and Toledo), Mexico Refractories Co. of Texas (Houston and Dallas), and Missouri Refractories Co., Los Angeles, to the name of the parent company. Kaiser Refractories also has opened a sales office at 2901 E. Fourth Ave., Columbus, Ohio.

Smith Steel Casting Co., Marshall, Tex., has purchased the foundry section of the former Bethlehem Steel Co. plant at Corsicana, Tex., from Lipsett Inc., New York. Smith is planning to open the foundry soon.

Pyrometer Co. of America Inc., Penndel, Pa., has appointed Clifford B. Ives & Co. Inc., Narberth, Pa., as its representative in the greater Delaware valley area.

Walsh Refractories Corp., St. Louis, has appointed Standard Refractories Ltd., 249 Hess St. N., Hamilton, Ontario, Canada, to be distributor of its products in the province of Ontario. Standard is represented by Fred J. Rutherford and John Folt.

Steel Abrasives Inc., Chattanooga, Tenn., plans to break ground at Fairfield, Ohio, next fall for a plant to manufacture foundry equipment.

Baker Industrial Trucks, division of Otis Elevator Co., Cleveland, has appointed Banks-Miller Supply Co., 330 Third Ave., Huntington, W. Va., and Lift Truck Service Inc., 4200 McIntosh Rd., Harrisburg, Pa., as franchised dealers. The company also has opened a sales and service branch at 5320 S. E. 26th Ave., Portland 2, Oreg. Wilton Smith is manager of the Portland branch.

Ajax Electric Co., Philadelphia, will handle sales and service throughout the United States of gas-fired furnaces produced by Barkling Fuel Engineering Co., Chicago. Ajax-Barkling furnaces will continue to be produced at the Barkling Chicago plant.

Pennsylvania Glass Sand Corp., New York, has moved its southwestern regional sales office from Tulsa, Okla., to 292 Meadows Bldg., Dallas 6, Tex.

Cardinal Casting Co., 112 N. Webb St., Webb City, Mo., has filed articles of incorporation listing 30,000 authorized shares without par value, with 500 shares issued.

Cosmo Wheels Inc., national marketing organization for Chicago Rubber Co., has established an office and warehouse at 1019 W. Fulton St., Chicago, Ill.

Metal Treating Institute reports billings of $3,585,800 for February, an increase of 26.8 per cent over February, 1959.

Report card on:

Cedar Heights Bonding Clay

Raw Materials	*From the world's finest clay deposits*
Mining	*Most modern methods employed*
Screening	*Super-refined; produced in 6 meshes*
Grinding	*Laboratory controlled throughout*
Packaging	*Strong, weather-proof. Stands hard handling*
Delivery	*Delivery dates are promises; they're kept*
Price	*In line . . . . and attractive*
Behavior	*Helps produce better castings*
Remarks	*Have you sent for your free sample yet?*

Ask for the address of the Cedar Heights distributor nearest you.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

Circle 661 on Page 53

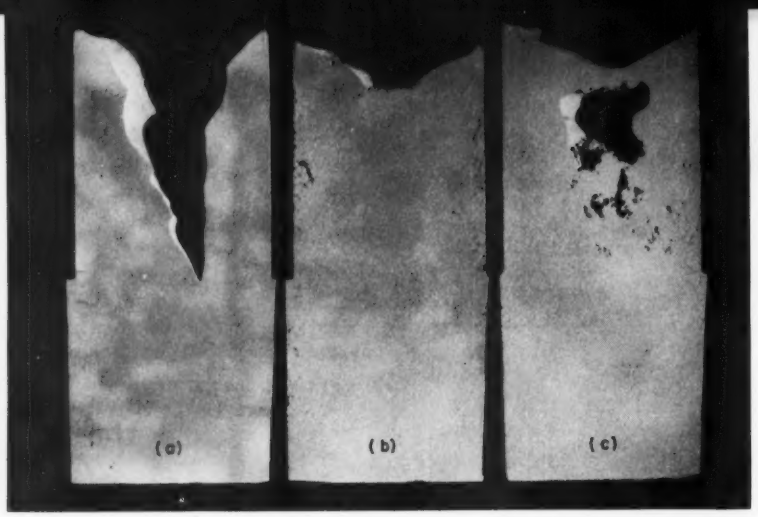
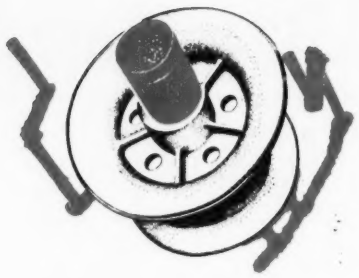


Fig. 1—(a) Pure aluminum—99.9 per cent Al; (b) 195 alloy—Al 4.5 per cent Cu; and (c) A132 alloy—Al-1.0 per cent Cu, 12.0 per cent Si, 1.0 per cent Mg, 2.5 per cent Ni. All sections from top-risered 5-in. cubes



RISERING Aluminum Castings

Gating and risering are closely interdependent processes. Size, shape, and location of gates often are dictated by risering. Conversely, gating must be considered when the risering is selected

By HOWARD F. TAYLOR, *Professor*; MERTON C. FLEMINGS, *Assistant Professor*; and THOMAS S. PIWONKA, *FEF Wheelabrator Fellowship Student*
Massachusetts Institute of Technology
Cambridge, Mass.
Department of Metallurgy

● IN RECENT YEARS extensive research has been conducted on riser requirements of pure metals and of alloys which freeze not too differently from pure metals (such as low-alloy)[1,2]. In these cases fundamental theories of fluid flow and heat flow have been adapted to practice; using these theories it has been possible to calculate the size riser needed to feed a given volume of a casting, and the distance the riser will feed through a given section thickness.

Unfortunately, little basic work has been directed at determining similar practical rules for risering castings made from aluminum alloys. Yet, such rules, when developed, will be of vital importance to aluminum foundrymen engaged in making high-quality castings.

The lesson to be learned from the steel foundry industry is a worthwhile one; here, results of risering research supported by the Steel Founders' Society (and others conducted at the U. S. Naval Research Laboratory) are used daily in shops throughout the country; practical use of the research data unquestionably results in increased quality and yield of castings, and a reduction in scrapped castings.

Different Conditions—There is a major difficulty in developing risering equations for aluminum alloys because the mode of solidification and mechanism of feeding in these alloys is vastly different from those of steel or pure metals. Rules for risering aluminum alloys will have to be based on a different set of fundamental variables and may be of quite different character than those developed for steel.

Fig. 1 illustrates how a riser used on a casting made from pure aluminum compares with those of two aluminum alloys. Castings shown are top risered 5 inch cubes which have been sectioned through the center. In the pure aluminum casting (Fig. 1a) all solidification

shrinkage appears as a deep "pipe" in the riser. In the 195 alloy casting (Fig. 1b) there is almost no pipe, and solidification shrinkage shows up primarily as (1) a drop in the over-all riser height during the initial stages of solidification, and (2) microshrinkage in the riser (and to a lesser extent in the casting).

The casting poured of A132 alloy (Fig. 1c) shows shrinkage characteristics between those of pure aluminum and of 195 alloy; some gross shrinkage is present but no extensive pipe. Most commercial aluminum alloys show shrinkage behavior generally similar to that of Fig. 1b or 1c.

Deep Piping Occurs—The pure aluminum casting freezes with deep piping because its mode of solidification causes it to freeze from the wall of the casting inwards, with a smooth front between the liquid and advancing solid. As solidification progresses and shrinkage occurs, a pipe results (Fig. 2).

In 195 alloy, the situation is quite different (Fig. 3). In this case, solidification begins near the mold wall but progresses quickly to the center of the casting; fine grains form near the center of the casting early in the solidification process. Freezing then continues, with solid metal forming in the center as well as near the walls of the casting.

It is not at all uncommon for the center of a 195 alloy casting to be more than 85 per cent solid before a fully solid skin has formed on the surface. This type of solidification, shown in Fig. 3, is termed "mushy" or "pasty." In the early stages of solidification, shrinkage is compensated by settling of liquid plus solid metal in the riser; a little later, when solid grains have formed a coherent network throughout casting and riser, liquid metal drains down through the channels between the grains to feed shrinkage. Still later, when the interdendritic liquid channels become too narrow to allow further passage of liquid metal, solidification shrinkage results in microporosity.

Solidification and shrinkage behavior of alloys such as A132 (Fig. 1c) are similar in most respects to 195 alloy. Fine grains form and grow throughout the casting during much of the solidification process, but some macroshrinkage usually is seen in risers of the alloy as a result of the large amount of eutectic present. While our understanding of the mechanism of solidification of eutectic alloys is limited at best,[3] it is clear that in many cases they solidify much more like mushy alloys (such as 195 alloy), than like pure metals; however, their shorter freezing ranges tend to make them less prone to develop microporosity.

Design Principles—The solidification behavior of most commercial aluminum alloys is similar to that of 195 and A132 alloys; this behavior (mushy solidification) affects riser requirements in important ways. Following are some general principles for designing risers for aluminum castings which result directly from the solidification mechanism described above:

1. The mushy nature of solidification of aluminum alloys means that fairly large risers usually are required (compared, for example, with steel). These large risers help maintain the thermal gradients necessary to keep interdendritic liquid feed channels open from the riser to the casting.

2. To eliminate completely all traces of microporosity, very steep thermal gradients are required; usually these gradients can be obtained only by chilling.

3. Since a solid skin does not form on aluminum alloy castings until late in the solidification process, surface defects often result from inadequate risering. The casting surface may be "dished" by atmospheric pressure, or interdendritic liquid may be drawn in from the surface, resulting in a dull, porous surface.

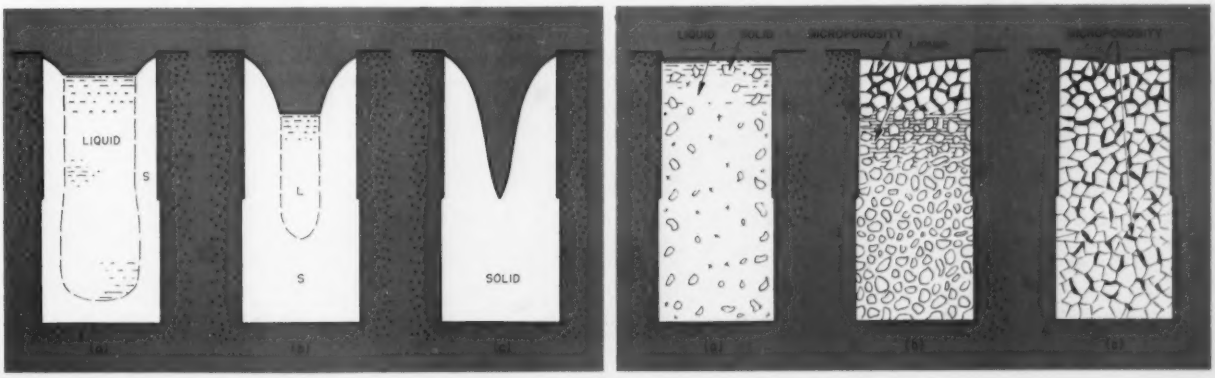
4. Also because of lack of a strong skin, overheating of sand in any one location can result in surface shrinkage. Overheating results from flowing too much metal over a location or from placing a riser too close to the casting.

Riser Shape, Size, and Feeding Distance—Riser shape for aluminum castings is determined by the same factors that determine riser shape for other metals. A riser is desired that has (1) a minimum surface-to-volume ratio, and (2) adequate liquid metal to feed solidification shrinkage.

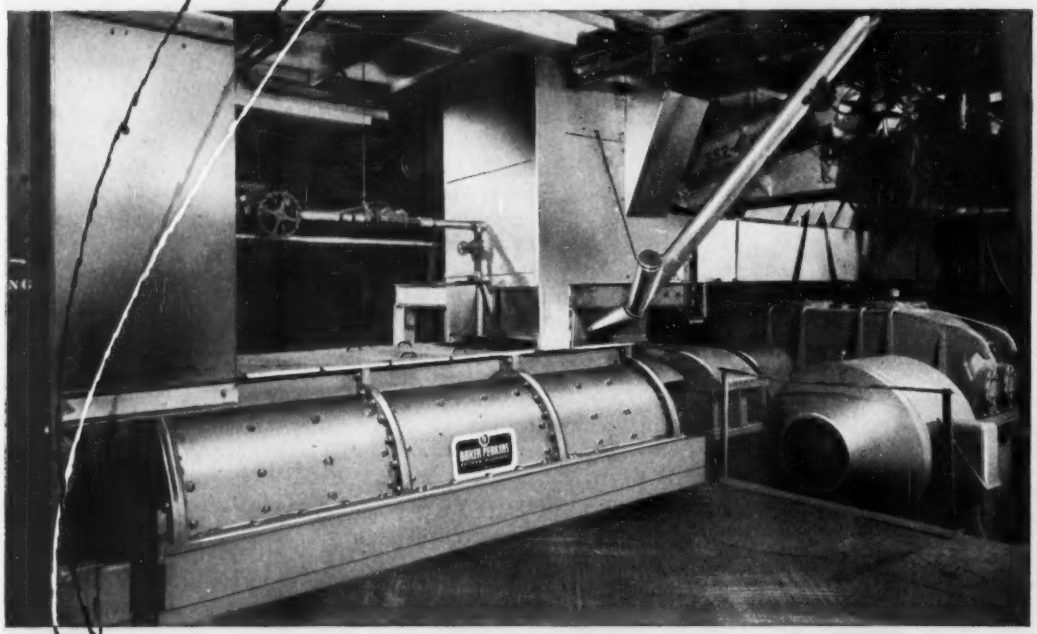
Cylindrical risers generally are employed; they are more efficient than risers of square cross section because of their lower surface-to-volume ratio. When a cylindrical riser is totally enclosed in sand (blind), the most efficient height-to-diameter ratio, from heat flow considerations, varies from 0.5 to 1.0 depending on riser contact area, shape of the top of the riser, etc.

Side risers frequently must be taller than this to maintain a positive metallostatic pressure on the casting during solidification (risers on aluminum castings will not feed "uphill" as they will on steel). It is usual practice to cut risers

Fig. 2, left—Solidification of a top-risered cube of pure aluminum. Fig. 3, right—Solidification of a top-risered cube of 195 alloy (Al-4.5 per cent Cu). Schematic diagrams show the solidification process (a) near the beginning, (b) near the end, and (c) at the end. The size of microporosity is exaggerated for clarity in these drawings



NOW . . .
a single B-P Continuous Muller handles 300 tons of sand per hour



The new Baker Perkins Size 8 Muller, now in successful operation in one of the midwest's automotive foundries, has 300% more hourly capacity than any available batch type muller and 100% more capacity than the next size B-P continuous unit. As with all B-P Continuous Mullers, cleaner, smoother castings are obtained with fewer rejects because molding sands are thoroughly mixed and tempered. The special Sigma-type agitators assure that each grain of sand is coated with the correct proportion of bond.

Baker Perkins builds Continuous Mullers in capacities from 30 to 300 tons per hour. Because of their rigid, rugged construction, B-P Continuous Mullers give many years of service. Installations in many of America's largest foundries have proven the efficiency of Baker Perkins Continuous Mullers under the most exacting conditions.

For further information about B-P Continuous Foundry Sand Mullers and B-P Unidor mixers for core and special process sand mixing, send for catalog No. F-156.

371

BAKER PERKINS INC.

FOUNDRY MACHINERY DIVISION • SAGINAW, MICHIGAN

Circle 662 on Page 53

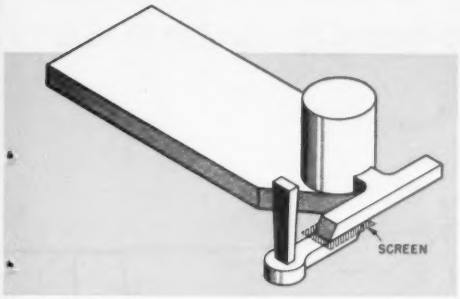


Fig. 4—Sketch of a typical end-risered plate casting

through to the cope (use open risers), both to obtain necessary height and to facilitate molding; such risers may have height-to-diameter ratios of 2 to 1 or more.

The size riser required to feed adequately a given volume of a casting depends on (1) geometry of the section and whether or not chills are employed, (2) alloy, (3) degree of soundness required, (4) riser shape and location, (5) riser treatment (such as insulation, etc.), and (6) gating.

Geometry of the section is important because, as with all metals, heavy sections or sections with reentrant angles freeze slower than thinner, simpler sections and therefore require larger risers. Chilling, by promoting directional solidification, can produce a sounder casting while enabling a reduction in riser size (chilling is discussed later in this paper).

Alloy analysis affects solidification shrinkage, so while the fundamental principles of risering are the same for all aluminum alloys, larger risers must be used for some alloys than others. Table I, from an ASTM specification, is one rating system for the various alloys as regards solidification shrinkage. The table also lists relative ratings for pressure tightness and for resistance to hot tearing of various commercial alloys. These casting characteristics are closely related to solidification behavior; alloys which require larger risers usually are more prone to contain microporosity and to hot tear. In general, alloys containing greater than about 5 per cent silicon (43 alloy, 356 alloy, etc.), require relatively less risering than alloys containing zinc or magnesium in appreciable amounts.

As a rule of thumb for commercial castings, riser diameter usually must be at least 1½ to 2 times the thickness of the section to be fed. Safest risering practices involve yields (weight of casting x 100 divided by weight of casting plus rigging) of less than 50 per cent.

One factor influencing minimum riser size for a given casting is the degree of soundness required in the casting. For example, consider an end risered plate casting of 195 alloy, 5 x 12 x 1 in thick (Fig. 4). If good surface appearance is the only requirement, this casting can be produced satisfactorily with a riser 2 in diameter x 5 in high (or even slightly smaller). If, however, the casting must pass x-ray inspection, a larger riser is essential (approximately 2½-in. diameter x 5 in. high is satisfactory). If a more sensitive x-ray technique is employed (radiography of a ⅛-in. thick slab from the casting), then a still larger riser gives much improved soundness. Fig. 5 compares soundness of ⅛-in. sections cut from two such plates.

Feeding Distance, Riser Location, and Riser Contact—Feeding distances of most aluminum alloys appear to be quite large compared with steel (the term "feeding distance" is used here to refer to the length plate or bar that can be made radiographically sound with a single riser). In contrast to the case of steel, increasing riser size increases effective feeding distance.[4]

In some alloys, the marked effect of riser volume on feeding even makes it possible to feed heavy sections through thinner ones. In these cases (if the thin section is not too long), a disproportionately large riser attached to the thinner section will fed the heavy section. Apparently the heating effect of the riser (combined with high thermal diffusivity of aluminum) heats the metal in the thin section enough that adequate feeding is obtained in the thicker one.

When top risers are employed for aluminum castings, shrinkage sometimes occurs beneath or just adjacent to the riser. The shrinkage results because these areas, heated by the large hot riser, may be the last portion of the casting-riser combination to freeze. This type of shrinkage can be eliminated by (1) chilling the casting, or (2) necking

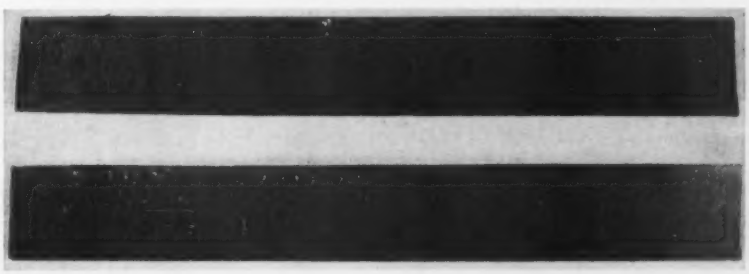
TABLE I—Shrinkage and Hot Tearing Tendency of Aluminum Sand Casting Alloys*

(1 indicates best of group, 5 indicates worst of group. Ratings are approximate)

Alloy		Solidification Shrinkage Tendency	Pressure Tightness	Resistance to Hot Tearing
ASTM Designation	Commercial Designation			
C4A	195	3	4	4
CG100A	122	3	3	3
CN42A	142	4	3	4
CS43A	108	2	2	2
CS72A	113	3	3	3
G4A	214	5	5	4
G10A	220	5	5	2
GM70B	....	5	5	3
GS42A	B214	4	4	3
S5A	43	1	1	1
S5B	5% Silicon	1	1	1
SC51A	355	1	1	1
SC64D	319	2	2	2
SC82A	Red X—8	1	1	1
SG70A	356	1	1	1
ZC81A	Tenzaloy	4	3	5
ZG32A	Ternalloy 5	4	3	5
ZG42A	Ternalloy 7	4	3	5
ZG61A	40E	4	3	5
ZG61B	A612	4	3	5

*Ratings from ASTM Specification for Aluminum-Alloy Sand Castings (B26-59T)

Fig. 5—Castings of 195 alloy. Riser on the top plate was 5 in. in diam x 5 in. high. Riser on the bottom plate was 2½ in. in diam x 5 in. high, and both plates were 5 x 8 in. x 1 in. thick, cast horizontally (as shown in Fig. 4). These x-ray sections were cut vertically in the center of the plate and were 1 x 8 in. x ⅛ in. thick. White spots are porosity



the original and consistently superior

- Ready availability
  (Check this map for your nearest Distributor)
- Proven Dependability
- Uniformity
- Non-Toxicity

Ready to Use. No mixing, no forming. Always pliable, workable, clean. "Keeps" indefinitely.

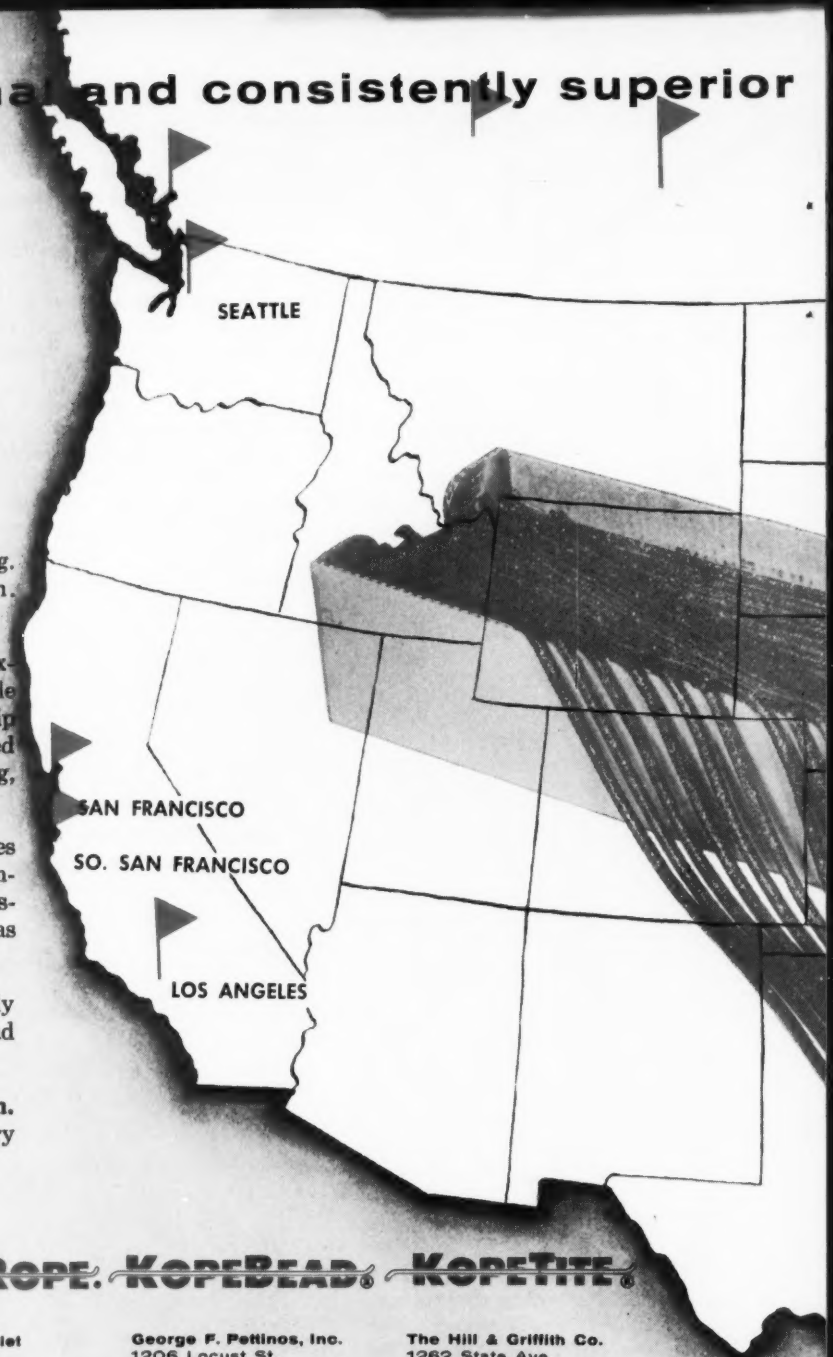
More Positive Seating. Uniform extrusion and high moldability provide quick "picture" of seating relationship between cope and drag. Unflattened bead areas indicate improper seating, call attention to needed correction.

Better, Cleaner Castings. Eliminates undesirable spacing. Controlled compressibility permits more accurate measurement of metal thickness. No gas by-product to cause blow holes.

Self-Dissipating. Burn-up leaves only slightest residue that doesn't affect sand re-use in any way.

Complete nationwide distribution. Check the map and buyers' directory below for your nearest distributor.

Samples available upon request.



KOPESEAL® **KOPEROPE®** **KOPEBEAD®** **KOPETITE®**

Frederic B. Stevens, Inc.
1800—18th St.
Detroit 16, Mich.
Branches: *Buffalo, New Haven, Indianapolis*

H. D. Fowler Co., Inc.
9th Ave. South & Lane St.
Seattle 14, Wash.

The Hubbard Co.
5041 Santa Fe Ave.
Los Angeles 58, Calif.
Branch: *2166 Market St. San Francisco, Calif.*

M. A. Bell Co.
217 Lombard St.
St. Louis, Mo.
Branch: *5802 Colfax St. Houston, Texas*

Railway & Power Engineering Corp. Ltd.
3745 St. James St.
Montreal 3, Quebec, Canada
Branches: *14 in Canada*

Jones Foundry Supply
718 E. 60th St.
Los Angeles, Calif.

Barker Foundry Supply Co.
120 South Linden Ave.
So. San Francisco, Calif.

Milwaukee Chaplet & Supply Corp.
8656 West National Ave.
Milwaukee, Wisc.

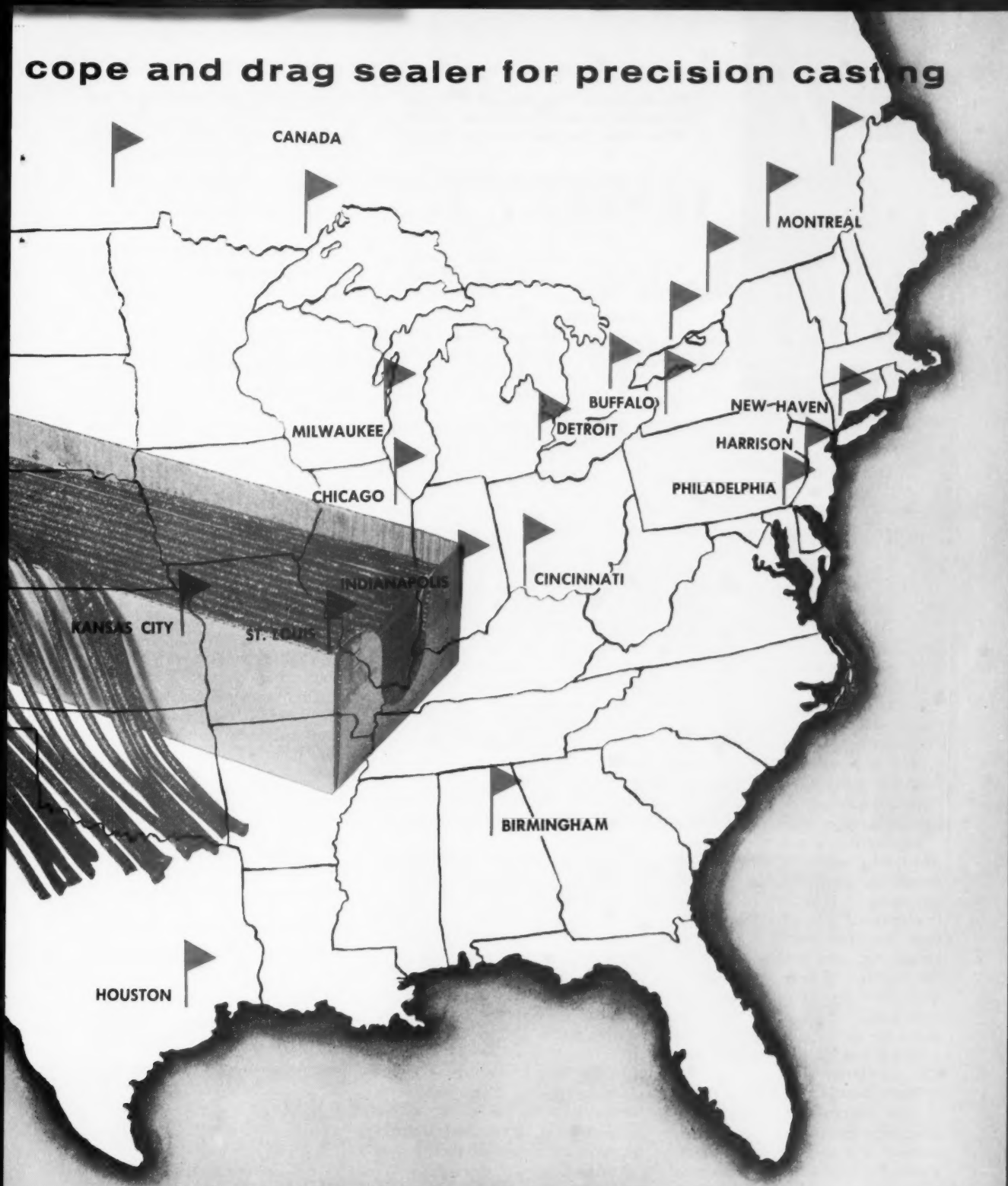
Springfield Facing Co.
South Second & Bergen Sts.
Harrison, N. J.

George F. Pettinos, Inc.
1206 Locust St.
Philadelphia, Penna.

Canfield Foundry Supplies & Equipment
1721 Minnesota Ave.
Kansas City, Kans.

The Hill & Griffith Co.
1262 State Ave.
Cincinnati 4, Ohio
Branches: *Chicago, Birmingham, Houston*

cope and drag sealer for precision casting



PRESSTITE DIVISION

AMERICAN-MARIETTA COMPANY

Circle 443 on Page 13

39TH AND CHOUTEAU AVE. • ST. LOUIS 10, MO

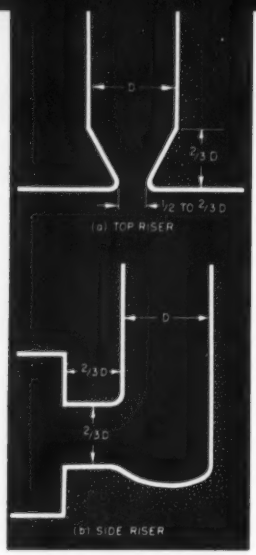


Fig. 6a, above—Top riser, which is recommended for aluminum casting. Fig. 6b, below—Side riser for aluminum casting

the riser. Neck diameters of one-third to one-half the diameter of the riser are satisfactory. A generous fillet should be used between the neck of the riser and the casting (Fig. 6a).

Side risers usually are easier to design correctly than top risers, because under-riser shrinkage is less of a problem. Fig. 6b is a sketch showing relative dimensions of the various portions of a satisfactory type side riser. These dimensions are approximate and depend on other factors dicussed here, particularly on alloy analysis and whether or not the casting is riser gated.

Important guides in the design of side risers are: (1) riser neck should be somewhat heavier than the section it is to feed and should be substantially smaller in diameter than the riser and (2) the riser should not be placed too close to the casting. If neck length is too short, overheating of metal and sand near the riser results in shrinkage in the casting. Fig. 7 is a typical riser-gated casting; it is of 356 aluminum alloy.

Riser Treatment—Various types of riser treatment are employed in aluminum casting to improve efficiency of feeding or to permit reduction in riser size. One extremely effective and widely practiced treatment is the use of gypsum insulation; another is the application of mildly exothermic materials to the tops or side of risers. Fig. 8, based on a theoretical and experimental investigation of riser behavior,[6] shows the effect of several treatments on solidification of a simple 4-in. diam x 4-in. high cylindrical top riser.

An untreated open riser is seen to solidify in 12.3 minutes; if a "perfect" insulator were placed on this riser, solidification time would be increased to only 14.3 minutes (preheated gypsum would be essentially a "perfect" insulator). By itself, insulating the tops of aluminum risers is not a very effective way of increasing riser life; this is because in risers of ordinary geometry most of the heat is lost into the sand walls, and very little is lost in radiation from the top.

In fact, at the solidification temperatures of aluminum alloys there is so little heat loss by radiation that open risers are generally more efficient than blind risers of the same geometry (in sand molds). For risers ordinarily employed in aluminum jobbing foundries, the following rules apply: (1) open risers are slightly more efficient than closed risers of the same geometry (for sand molds), and (2) insulating the top of the risers (without also using insulating sleeves) is not an effective way of increasing riser efficiency. Exceptions to these rules occur only for very large risers or for risers with small ratios of height to diameter.

Use of insulating (gypsum) riser sleeves is a much more effective way of increasing riser life. Application of a sleeve to the 4-in. diam riser of Fig. 8 increases solidification time from 12.3 minutes to 31.1 minutes because it insulates that portion of the riser where most of the heat loss occurs. Now, because of the much longer solidification time of the insulated 4-in. diam riser, top heat losses become appreciably more important, and some benefit is to be gained by adding top insulation. Such insulation can increase solidification time to as much as 45.6 minutes.

Gypsum riser sleeves for use in casting aluminum are obtainable commercially or may be fabricated readily. Care must be exercised to assure that the sleeves are dried adequately before use and that they are not left in green sand molds long enough to absorb large amounts of water; use of "permeable metal casting plaster" for producing sleeves greatly decreases danger of blows due to moisture pickup.[9] For insulating the tops of the risers, mildly exothermic materials are available or standard metal casting plaster can be used—preferably heated before applying.

Chilling—Chills are used on aluminum castings to (1) eliminate porosity in sections of a casting that are difficult to riser, (2) decrease the number of risers required, (3) decrease the size risers required, and (4) increase mechanical properties of the casting.

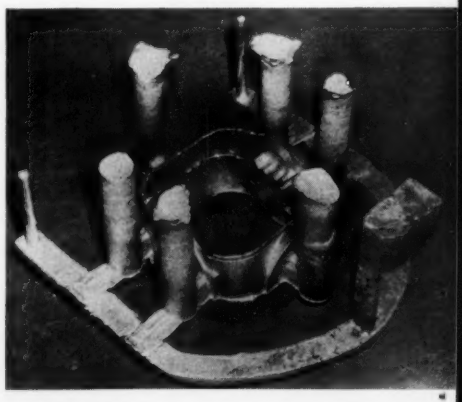
Large, complex aluminum castings often are cast successfully only by extensive application of chills to isolated heavy sections. Were it not for these chills, a prohibitively large number of risers would be required. Chilling is desirable and economical to aid in producing sound castings but unfortunately is not yet widely used in aluminum foundries.

The following points are useful guides in chilling castings:

1. Chills promote directional solidification but do not feed. For chills to effect soundness in an isolated heavy section they must promote directional solidification *toward a riser*. If chills are separated by more than an inch or so on relatively thin castings, some way must be arranged to feed hot metal between the chills.

2. Casting glows can result from evolution of moisture from chills unless proper precautions are observed. For green sand molds, chills should be coated with a light wash of material such as silica-bentonite,

Fig. 7—Housing casting which is side-risered (and riser-gated)



OHIO STOVE COMPANY FOUNDRY holds production costs down with SIMPLICITY equipment

At Portsmouth, Ohio, in the modern foundry of the Ohio Stove Co., the SIMPLICITY 4′ x 6′ shakeout and the 30″ x 17′ model VS-12 conveyor (shown here at work) are helping speed operations and reduce unit production costs. First, snap molds are floor dumped; then both castings and sand are scooped and loaded onto the SIMPLICITY shakeout. The castings are then carried on the SIMPLICITY conveyor to the waiting tote boxes. The many plants that are using SIMPLICITY shakeouts are indicative of their foundry-proved superiority. Get complete facts on SIMPLICITY shakeouts, feeders, and conveyors. Write us today.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario
FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

190

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY • DURAND 7, MICHIGAN

Circle 664 on Page 53

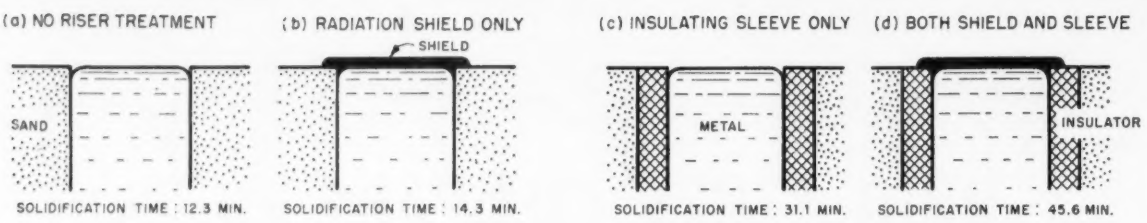


Fig. 8—Solidification of aluminum risers 4 in. in diam by 4 in. high. From left to right: (a) No riser treatment, (b) Radiation shield only, (c) Gypsum insulating sleeve, and (d) Both shield and insulating sleeve[6]

dried and *thoroughly cooled* to room temperature before molding. Large chills on drag surfaces should be avoided. Chills over about 1 in. square can be grooved to aid in venting, although usually this is unnecessary for chills on vertical surfaces.

3. The relative efficiencies of various materials as chills (heat extractors) depends on whether the chill is small or large with respect to the section of the casting that is to be chilled, and on whether the comparison between chill materials is made on a weight basis or volume basis. In general, comparing copper, cast iron, and aluminum: (1) when small chills are to be used to help establish gradients in large sections, cast iron or copper are preferable; cast iron usually is chosen for economic reasons, and (2) aluminum or copper is preferable when relatively large chills are employed; aluminum has distinct advantages in economy and ease of molding.

4. "Large" chills are chills that weigh more than about one to two times the section on which they are acting. Still larger chills have little additional effect on the pattern of solidification.

In addition to using chills to promote and achieve average radiographic soundness, several foundries today are chilling castings to achieve homogeneity and soundness on a micro-scale, thereby producing castings with unusually high mechanical properties. Judicious chilling, plus careful control of other foundry variables—gas content, chemical composition—are the techniques used to produce the "Premium Quality" castings covered by Government Specification MIL-C-21180.

When a plate casting, such as that sketched in Fig. 4 is chilled on its extreme end, mechanical properties are enhanced near the chill as well as at some distance away from the chill. The increase in properties results from (1) elimination of microporosity that is too fine to be seen by ordinary radiographic techniques and (2) refinement of intergranular constituents. Fig. 9 shows how properties of a high-strength aluminum casting alloy are increased by chilling.

Properties such as those shown in plate castings can also be achieved in complex commercial castings; this is done by spacing chills and risers in such a way that sound, homogeneous metal is obtained throughout the casting. Fig. 10 shows how a typical casting would be risered and chilled to achieve optimum properties. This casting is the same one pictured in Fig. 7 where more conventional risering practice was employed.

The essential principle of designing rigging to achieve high properties is that chills and risers are spaced alternately so the entire casting freezes directionally (towards a riser) with steep thermal gradients. Chill prints can be seen on the casting between each of the risers in Fig. 10. Fig. 11, a photograph of the original mold, shows chill locations more clearly. Chills and risers were spaced at 2-in. or smaller intervals over the entire casting.

Techniques outlined above, and described in more detail in the literature, [7,8] permit guaranteeing minimum mechanical properties in 356 alloy castings of at least 38,000 psi tensile strength, 28,000 psi yield strength, and 5 per cent elongation. These properties represent an increase of 70 per cent in ultimate tensile strength, 85 per cent in yield strength, and 670 per cent in elongation, when compared with average properties formerly specified for bars cut from castings.[5]

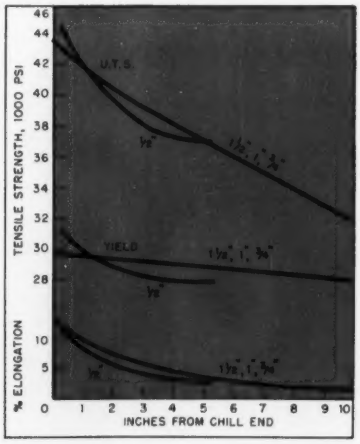
Advantages of "Premium Quality" castings to the design engineer include greater strength and ductility with less weight, and also greater reliability due to the more rigorous controls and inspection procedures employed. "Premium Quality" castings now are being produced commercially with mechanical properties even higher than those cited above, and in a variety of commercially important high-strength alloys.

Gating and Risering—Gating and risering are closely interdependent processes. (In a previous article, "Gating of Aluminum Castings," April issue, the close interdependence of gating and risering was discussed. Because of the importance of this relationship in riser design, portions of that discussion are repeated here.)

The size, shape, and location of gates often are dictated by the method of risering; conversely, risers should not be chosen without consideration of the method of gating. For most types of aluminum castings, riser gating is desirable and is practised whenever possible. Fig. 4 and 7 illustrate typical examples of riser-gated castings. In each case, metal does not enter the casting directly but passes first through side risers.

There are several advantages in this type of gating: The last (and hottest) metal ends up in the riser,

Fig. 9—Graph gives a summary of tensile properties of end chilled 356 alloy plates of various sizes[7]

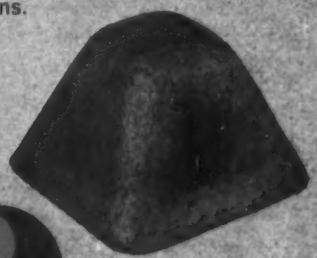


Circle 665 on Page 53→

Tramp elements begone!

GLOBE SILVERY IRON is virgin metal produced in a blast furnace from natural iron ores. Tramp elements are therefore at a minimum.

Closer chemical and physical control in the cupola is possible when Globe Silvery is used and you avoid the need for highly concentrated alloy additions.



P M

PICKANDS MATHER & CO.
Cleveland 14, Ohio

Chicago • Cincinnati • Detroit • Duluth
Erie • Greensboro • Indianapolis • New York
Pittsburgh • St. Louis • Washington

Iron Ore • Pig Iron • Coal • Coke • Ferroalloys
Lake Fueling • Lake Shipping

where it belongs for optimum directional solidification; hot metal passing over the riser base and through the riser neck heats the sand in these areas, thus promoting directional solidification; removal of gates does not require an extra cleaning operation (they are removed when the risers are cut away).

"Cold metal" risers (risers not joined directly to a gate) usually must be somewhat larger than hot metal risers if they are to feed properly. In some cases, extreme difficulty is experienced in making cold metal risers feed intricate castings adequately; in these cases, "hot topping" sometimes is employed.

The simplest and least satisfactory method of hot topping is to pour hot metal directly down the risers. Late in the pouring operation, as risers are beginning to fill from the gating system, an additional ladle is used to pour metal directly into the risers. This technique promotes directional solidification but its disadvantage is that dross and air are easily entrapped and carried into the casting.

A modified hot topping practice which is currently in favor gives much better results in producing castings of high quality. In this case, a three-part flask is used with two separate gating systems. Runners and gates of one system are at the lower parting line and feed directly to the casting. Runner and gates of the other system are at the upper parting line and feed directly to the risers (top risers or side risers). The casting then is poured from the first gating system, and risers are topped by delayed pouring through the second system.

Summary—This article, and the one immediately preceding it, have dealt with principles and practical aspects of gating and risering aluminum castings. The functions of an ideal gating system for aluminum castings are to (1) fill the mold cavity, (2) introduce molten metal into the mold with as little turbulence as possible to minimize absorption of gases, dross formation, and mold erosion, (3) introduce proper skimming action on the metal as it flows through the gating system, (4) regulate rate of entry of metal into the mold cavity, (5) establish the best possible temperature gradients in the casting, and (6) produce a casting with minimum excess metal in gates and risers.

To accomplish the above objectives is not an easy task, and careful design of the gating system is essential. Recommended gating design includes use of pouring cup or basin, tapered sprue, sprue well, unpressurized gating system, screens to filter dross, riser gating, and others. Gating systems should be designed by an engineer and formed with patterns rather than left to the discretion and skill of the molder.

Gating and risering are closely interdependent processes. The size, shape, and location of gates often are dictated by the method of risering; conversely, risers should not be chosen without consideration of the method of gating. Hot metal side risers are recommended for aluminum; top risers are not as efficient and require more care to design properly.

Aluminum alloys solidify in a mushy manner; consequently, relatively large risers usually are required. These large risers help maintain the thermal gradients necessary to keep interdendritic liquid feed channels open from the riser to the casting. To eliminate completely all traces of microporosity (microporosity which is not visible by ordinary x-ray inspection techniques, but which nonetheless influences mechanical properties) very steep thermal gradients are required; usually these gradients can be obtained only by chilling.

Recommended riser shape for aluminum casting is one with a minimum surface-to-volume ratio but tall enough to maintain a positive metallostatic pressure on the casting during solidification. The size required to feed a given section depends on (1) geometry of the section and whether or not chills are employed, (2) alloy, (3) degree of soundness required, (4) riser shape and location, (5) riser treatment (such as insulation, etc.) and (6) gating.

Enough basic information is available so that certain guiding principles and rules of thumb can be used in riser design. However, much more remains to be learned of the fundamental solidification and feeding mechanisms of aluminum alloys. When this information is obtained, additional rules will almost certainly result that will prove to be important and useful to aluminum foundrymen for the economical production of high-quality castings.

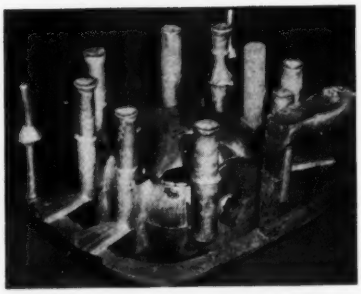


Fig. 10—Gating, risering, and chill location are shown on this premium quality housing casting[8]

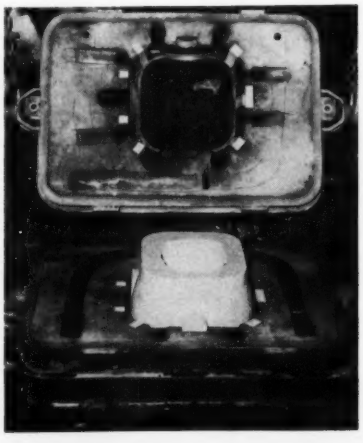
REFERENCES

1. Caine, J. B., "A Theoretical Approach to the Problem of Dimensioning Risers," *Transactions*, AFS, 56, 492-501, 1948.
2. Adams, C. M., Jr., and Taylor, H. F., "Fundamentals of Riser Behavior," *Transactions*, AFS, 61, 686, 1953.
3. Ruddle, R. W., "The Solidification of Castings," Institute of Metals Monograph and Report Series No. 7, The Institute of Metals, London, 1957.
4. Flemings, M. C., and Taylor, H. F., written discussion of "Some Principles for Producing Sound Al-7% Magnesium Castings," by W. H. Johnson, J. G. Kura, presented AFS, 1959.
5. Federal Specification QQA-601a.
6. Adams, C. M., Jr., and Taylor, H. F., "A Simplified Analysis of Riser Treatments," *Transactions*, AFS, 60, 617, 1952.
7. Flemings, M. C., Norton, P. J., and Taylor, H. F., "Performance of Chills on High Strength-High Ductility Sand Castings of Various Section Thicknesses," *Transactions*, AFS, 1957.
8. Flemings, M. C., Norton, P. J., and Taylor, H. F., "Rigging Design of a Typical High Strength-High Ductility Aluminum Alloy Casting," *Transactions*, AFS, 1957.
9. "Product Information, Data, Applications, and Use," U. S. Gypsum Co., Chicago.

Acknowledgment—Illustrations courtesy of George E. Schmidt Jr., Massachusetts Institute of Technology, and John Wiley & Sons, Inc.

● For an extra copy of this article, until supply has been exhausted, use card on Page 53

Fig. 11—View of the mold for a premium quality housing casting[8]



AT THE A.F.S. EXPOSITION

cordially invites you to inspect its . . .

- ☆ NEW AUTOMATIC SHELL CORE BLOWER
- ☆ "TURBO-RAM" SAND RAMMER
- ☆ "ELECTRAMOLD" AUTOMATIC MOLDING MACHINE
- ☆ POWERED "FLASKLESS" MOLDING MACHINE
  mold size: 16" x 22"
- ☆ CONTINUOUS SAND MULLERS
  30 and 250 tons per hour

These highly efficient foundry machines will be displayed in the Exhibition Hall

BOOTH NO's. 1429-1433 • 1528-1532

F. E. NORTH AMERICA, LTD.

47 ADVANCE ROAD, TORONTO 18, ONTARIO, CANADA

TELEPHONE: BELMONT 3-3227 • TELEGRAMS: EQUIPMENT, TORONTO

Circle 666 on Page 53

Foundry Developments

By EDWIN BREMER

Metallurgical Editor

Eliminates Machining

ARMY has found that use of investment castings for some small arms components not only eliminates machining operations and reduces expensive tooling, but also simplifies the making of certain components.

In some cases it has been possible to design a single casting to replace the several components required in a conventional machining. It was also found that the amount of alloy used in some castings could be cut. Another benefit listed is improved service life for flash suppressors.

Details are available in report PB 161268, "Utilization of Investment Castings for Small Arms Weapon Components" by J. F. Panda, which is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25 for $1.25.

Hardness Chart

CONVERSION chart which shows the approximate relationship between hardnesses determined by various testing systems, and tensile strengths of carbon and alloy steels has been issued by the Tubular Products Division, Babcock & Wilcox Co., Beaver Falls, Pa. Hardness systems covered are Brinell, Monotron, Vickers, Scleroscope, and Rockwell B, C, and E scales.

Studies Segregation

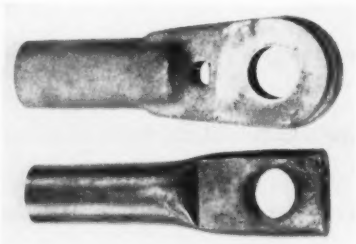
RESEARCH is being conducted at the Department of Mining and Metallurgy, University of Wisconsin, on metallurgical factors affecting the brittleness of metals, reports Prof. Philip C. Rosenthal, chairman. One of the phases is aimed at determining the laws that govern the segregation of impurities in the grain boundaries.

With understanding of what elements segregate and what effects they cause, it might be possible to avoid or control them in the processing of metals. Another phase of the research is directed to playing one element against the other to control grain boundary segregation. Addition of controlled amounts of one element may prevent uncontrolled segregation of another element.

Tests already have proved that as little as 0.001 per cent of an element can have a decided effect on the subsequent behavior of the metal being treated.

Castings Costs Less

SIMPLICITY of flattening a piece of steel tubing and drilling a hole in it appeared to an agricultural machinery maker as the most economical way of making a drag link. However, his malleable iron supplier showed him how to save 38.7 per cent on the part. Cost of the steel link was 68.5 cents but that of the malleable iron part was only 42 cents.



Lower cost casting at top replaces flattened steel tubing part

Lower cost of the malleable iron part was due to elimination of drilling the holes by use of cores, and producing six links in a mold. Lancaster Malleable Castings Co., Lancaster, Pa., made this cost-cutting redesign.

Coating of Patterns

GAS-SOLID fluidization has been used successfully to apply particle coatings on investment patterns, according to a report issued by the Office of Technical Services, Department of Commerce, Washington 25. Complete fluidization of particle beds was achieved by using a porous refractory diffuser plate and a controlled fluid input from a 90 psi source. Requiring only a few seconds of labor and a simple movement of the pattern, coating was rapid and even.

The process proved less costly than mechanical units used for continuous coating. Other advantages are reduction in lost solids, elimination of pattern damage from a particle stream and atmospheric pollution by dust. Only maintenance required was a periodic screening of the particle bed to remove any impurities accumulated during tests.

Complete information is presented in the report designated PB 161098, "Particle Coating in Investment Mold Manufacture Utilizing Solid Fluidization" by F. Quigley and E. Deluca. Price of the report is 50 cents.

Dislocations in Metals

THROUGH use of electrical equipment developed in Ford Motor Co. Scientific Laboratory which measures time accurately to 1/100 of a millionth of a second, Dr. George Alers has been able to determine the travel of dislocations in metal. Dislocations are defects in the orderly arrangement of atoms of solids whose motion causes bending and breaking in materials.

By sending 10-million cycle sound waves into high-purity copper it was discovered that where dislocations were free to move they absorbed five times the energy that would pass through if there were no dislocations. During the experiment it was found that at nearly absolute zero, minus 452° F, although dislocation motion was not stopped, it no longer absorbed energy. Lead produced comparable results, and more studies are being made to establish the universality of this effect in metals.

When reasons for energy being absorbed by dislocations are fully understood, it may be possible for metallurgists to develop stronger materials.

METALGRAMS

. . . news about "Electromet" ferroalloys and metals

UNION CARBIDE METALS

MAY, 1960

EYES ON PHILADELPHIA -- The week of May 9-13 will see thousands of foundrymen descend on Philadelphia to attend the 64th AFS Castings Congress and Exposition. They'll attend technical sessions covering the latest production techniques and metallurgical developments and visit exhibits featuring new equipment and materials. For the latest uses of ferroalloys to produce better castings, foundrymen will want to visit Union Carbide Metals' extensive exhibit covering 41 foundry alloys. Featured are alloys that give better properties to cast iron, allow more efficient production of ductile iron, cut costs of steel, and give greater purity to aluminum.

* * *

ON-THE-SPOT INFORMATION -- Questions on the selection and use of ferroalloys will be welcomed at the Union Carbide Metals' exhibit at the Foundry Show. Experienced metallurgists and engineers will be on hand to provide on-the-spot assistance. You are cordially invited to visit the exhibit and talk to UCM personnel. See us at booth No. 1214.

* * *

ADDS HEAT -- Some iron foundries making chromium additions to the ladle have found that as much as one per cent chromium will dissolve readily when added as "Chromtemp" exothermic ferrochrome. The exothermic reaction of the alloy rapidly brings the addition to white heat, resulting in fast solution and consistently high chromium recovery. Temperature loss resulting from the alloy addition is negligible. Ask your Union Carbide Metals representative for further information and specification sheet, F-20,124.

* * *

ALLOYS IN MALLEABLE IRON -- Malleable producers are showing greater interest in the improved production possible with tiny amounts of alloying elements. For example, about 0.002 per cent boron, conveniently added in the cupola as boron-bearing ferrosilicon or to the ladle as ferroboron, cuts the annealing time of castings by as much as one-third. Boron also counteracts residual elements like chromium which retard formation of the malleable structure. For further information on alloy additions, plus new data on high-temperature properties of malleable castings, write for the article, "Malleable Iron Lifts Its Temperature Barrier," in the Winter 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

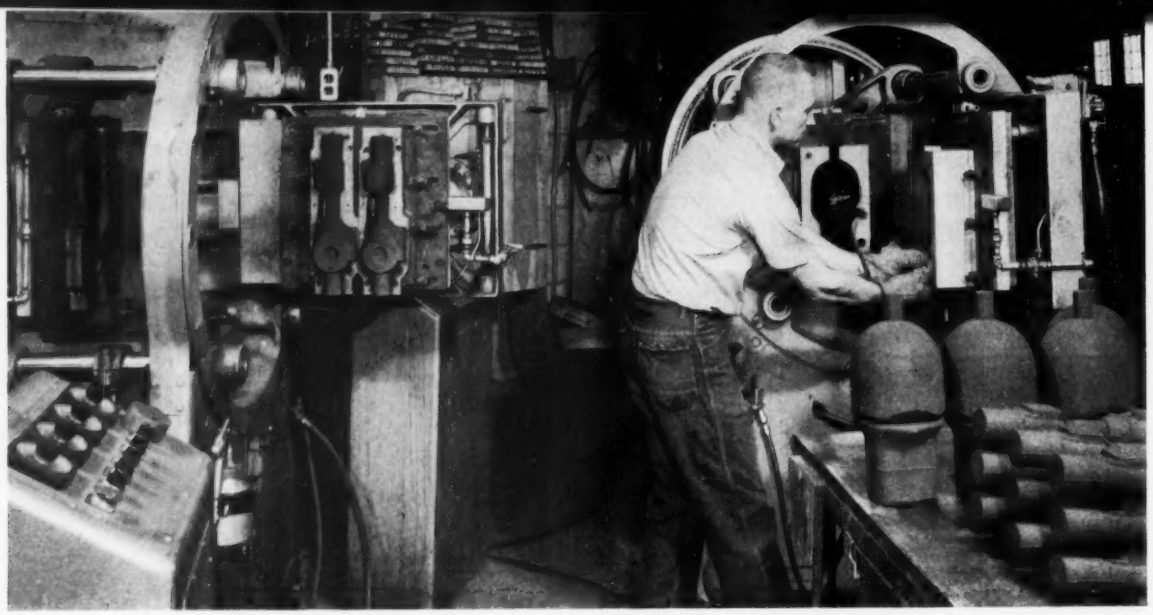
GASES ARE FLUSHED OUT -- A new alloy -- magnesium-calcium-silicon -- has been used successfully to flush out gases in high-alloy heats melted in the induction furnace. The alloy is added to the ladle and produces a vigorous flushing action. One producer reduced his rejection rate caused by gas imperfections from 30 to 5 per cent on a 35 per cent nickel, 15 per cent chromium casting. The case history can be found in the article, "Rejections Cut With New Alloy," in the Winter 1960 issue of UNION CARBIDE METALS REVIEW or contact your UCM representative for further details.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.

"Electromet" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Circle 667 on Page 53



One operator services two automatic shell core blowing machines. Unit pours the sand into corebox, heat impregnates the sand, and the machine opens for removal of the core

Production Raised by

IMPROVED MOLD HANDLING

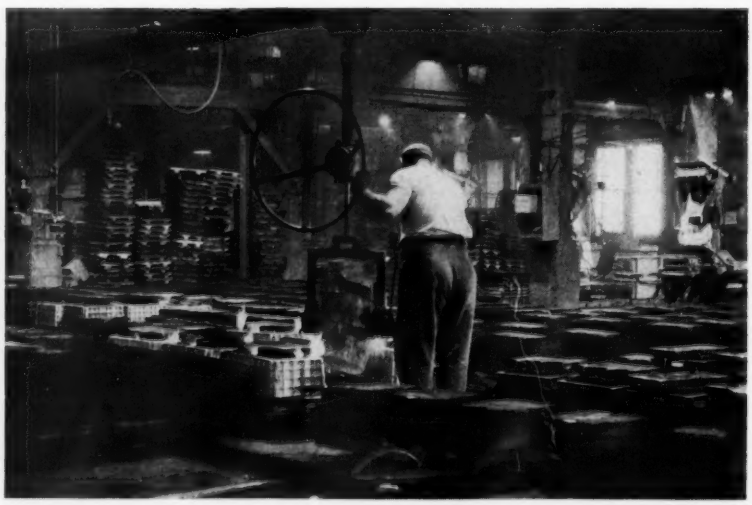
● INSTALLATION of modern equipment is reported to have increased production 25 per cent at the Deming Co. iron foundry in Salem, Ohio.

Deming Co. is a manufacturer of pumps and water systems for residential, commercial, and industrial use and is building to meet present and projected increases in pump market potential. Mechanization of the foundry is a part of the company's planned total tooling-up operation.

Biggest feature of the remodeled and modernized foundry is elimination of much of the manual lifting formerly required. Additional safety features also have been introduced to provide foundry workers with more comfortable, safer working

Pallets are raised automatically by air cylinders to work level height to minimize lifting

Molds are filled from a ladle transported on a monorail conveyor, which runs the full length of the pouring floor and loops back to the cupola



"MABCO"

Finer Products

"Everything for the Foundry"

Manufacturers and distributors of foundry facings, foundry supplies, core oils, core binders, foundry tools and equipment.

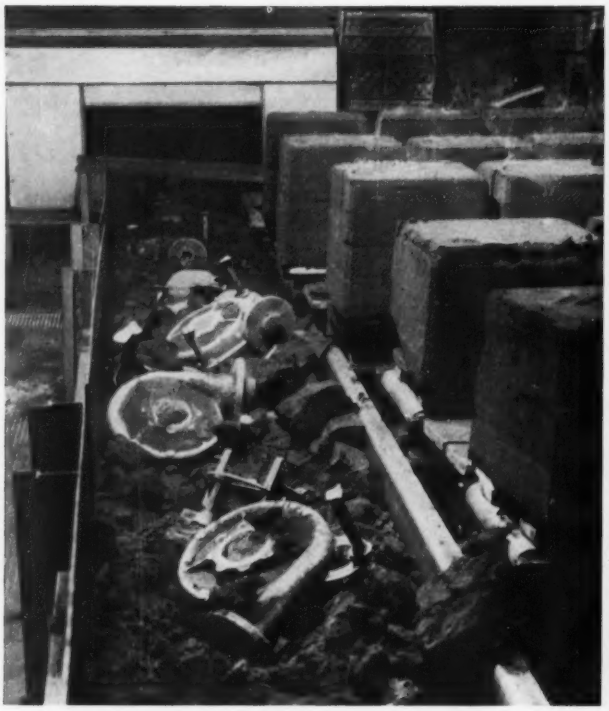
In product quality, service, engineering, research and development . . . you can't beat MABCO as a dependable source of supply.

M. A. BELL COMPANY

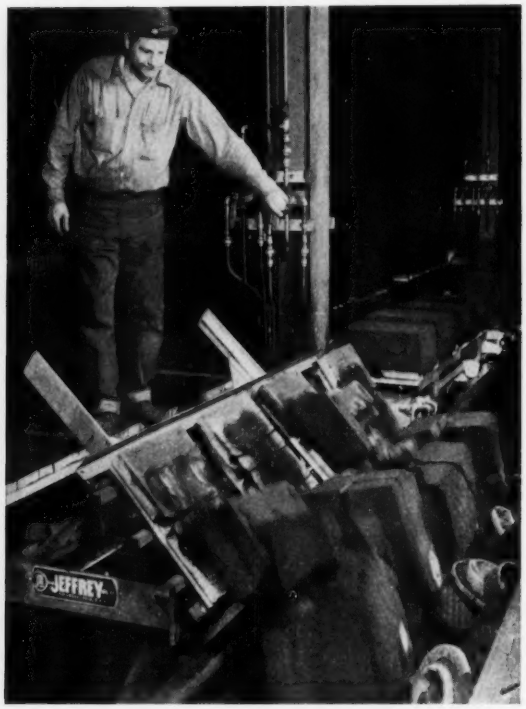
217 Lombard Street
St. Louis 2, Missouri

5802 Colfax Street
Houston 20, Texas

Circle 668 on Page 53



Castings and sand approach the shakeout screen. They are carried on a vibrating pan conveyor



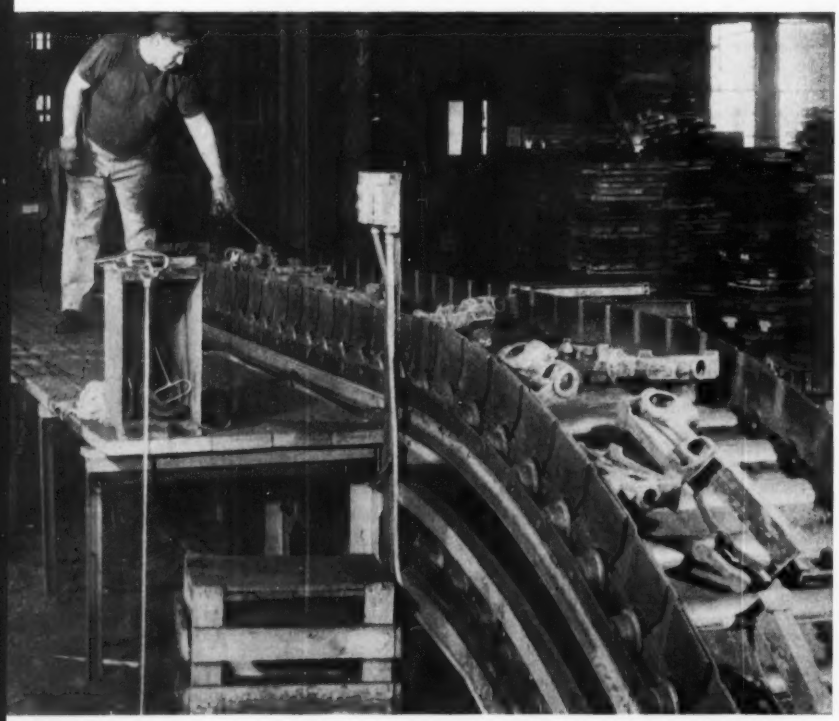
Air pressure activates tilting of the pallet. Castings tumble onto the vibrating pan conveyor

conditions. Elimination of manual lifting is particularly marked on the pouring floor. A battery of molding machines is located at one side of the floor, pouring is done in the middle, and castings are dumped on the far side.

Molds on Pallets—All molds are carried on mold pallets. Each pallet accommodates about four average-sized molds. As pallets are filled with molds, they are rolled forward, away from the molding machines, to the pouring station. Teams of pourers and their helpers then pour the molds and roll them onto the cooling station.

Changes in pouring procedure have been one result of the modernization. Molten iron is tapped from the cupolas directly into pouring ladles, which are covered to keep the metal hot longer and to protect the pourer from heat during pouring. The ladles easily are transported from cupola to pouring stations on an overhead trolley conveyor. As one pourer empties his ladle, he moves off the pouring floor out of the way of other pourers on the floor and proceeds around the loop conveyor back to the cupola for more iron.

After the castings have cooled in the molds, they are dumped, along with the sand, onto a vibrating pan



After passing over the shakeout screen, castings are carried to a sorting station and placed in baskets for additional cleaning before they are machined

PHOTOGRAPH COURTESY WHITING CORPORATION

REFRACTORIES SPECIFICALLY DESIGNED

to meet electric furnace requirements

Because of the versatility of the electric furnace—for primary melting, for duplexing, or for holding—for iron, steel, malleable iron, and non-ferrous metals—a wide variety of refractories are needed to meet the many types of service requirements. For electric furnace roofs, A. P. Green super duty brick, high alumina brick, silica brick, and monolithic refractories have performed outstandingly in many applications.

For indirect arc electric furnaces, we can furnish high alumina, mullite, or a wide variety of ramming mixes and cements.

A. P. Green REFRACTORY PRODUCTS

SERVE THE WORLD'S INDUSTRIES

A. P. GREEN FIRE BRICK COMPANY

Mexico, Missouri, U. S. A.

In Canada: A. P. Fire Brick Company, Ltd., Toronto, Ontario

PLANTS: Mexico, Mo. • Woodbridge, N. J. • Sulphur Springs, Texas • Jackson, Oak Hill, South Webster, Ohio • Philadelphia, Climax, Tarentum, Pa. • Troy, Idaho • Pueblo, Colo. • Macon, Ga. • Birmingham, Ala.

Circle 669 on Page 53

conveyor which extends along one side of the pouring floor. To dump the castings onto the vibrating pan conveyor, the operator glides the pallet onto a dumping platform. He activates an air cylinder which tips the platform and dumps the castings onto the conveyor. Pallets are held on the platform by restraining lugs.

After the castings have been dumped, the operator returns the platform to level position, activates another air cylinder, and the platform tips in the opposite direction, allowing the pallet to roll beneath the pouring floor, back to the molding machines on the opposite side. Momentum of the pallet when it rolls off the tipped platform is enough to return it to the molding station.

Air-Cylinder Operated — At the molding machine, as the operator needs a pallet upon which to place molds, he activates an air cylinder which elevates the pallet to the pouring floor level behind him as he faces his machine. The pallet automatically elevates to the correct position on the track, ready to receive new molds and roll back across to the pouring station.

As castings reach the shakeout screen, sand falls through and is conveyed to a magnetic pulley which pulls out metallic impurities. The sand then is elevated to an 80-ton storage bin where it remains until it is dropped from the bin for conditioning prior to being elevated again to bins over the molding machines.

Deming uses synthetic sand, on which close qualitative analysis is made in the company's modern foundry laboratory. Sand is checked for moisture content, compressive strength, and other qualities which will make the best possible castings, and technicians decide which additives are necessary, in what quantities.

Hooded Shakeout — A welcome feature in the new foundry is a hooded shakeout screen. This permits dust and heat from the screen to be ducted from the foundry area and exhausted into a dust collector. After castings have passed over the shakeout screen, they go onto an apron conveyor which transports them to the sorting station. There they are sorted and placed in baskets, ready for additional cleaning prior to machining.

ATTENTION ALL GRAY IRON FOUNDRIES . . .

Now! HOT METAL

NEW U. S. "SKLENAR"

REVERBERATORY

MELTING FURNACE

LOOK AT THE RECORD

Here's authentic performance data on 500 lb., 1000 lb., and 2000 lb. U. S. "Sklenar" Furnaces equipped with straight gas, oil, or dual fuel burners (no addition of fuel oil necessary when firing with gas), all three furnaces melting gray iron to high temperature for pouring light and difficult castings, with full charges consisting of one half pig iron, with balance in gates, risers and ordinary purchased scrap.

MELTING DATA

500 LB.	1000 LB.	2000 LB.
Time: 30 min.	Time: 40 min.	Time: 45 min.
Oil Used: 11½ gals.	Oil Used: 19 gals.	Oil Used: 40 gals.
*Gas Used: 1400 cu. ft.	*Gas Used: 2800 cu. ft.	*Gas Used: 5250 cu. ft.

*1030 BTU

Really hot metal . . .

of sufficient temperatures to pour light and difficult castings of excellent structure and machinability, with practically no rejects—that's the money-saving story behind the performance record of the revolutionary new U. S. "Sklenar" Reverberatory Melting Furnace. Innovations in combustion, design and construction, with patented features that contribute to faster melting, built-in economy of operation, and lower maintenance costs, are all yours in tomorrow's method of melting metals today!

Available in sizes ranging from 500 to 2000 lbs.—iron, brass and bronze (⅓rd these capacities for aluminum melting).

Get free bulletin. Send today for valuable and informative brochure.

For over 40 years builders of the well-known and favorably regarded U. S. Rotary Melting Furnaces.

U. S. SMELTING FURNACE CO.

BELLEVILLE, ILLINOIS

Guide for Recruiting College Graduates Published by ASEE

Eight-page leaflet published by the American Society for Engineering Education lists recommended practices and procedures of employers, colleges, and students in the process of employment. The guide is entitled "Recruiting Practices and Procedures—1959."

It is designed to regulate recruiting to promote a wise and responsible choice of career, to strengthen students' sense of integrity to develop in students an attitude of personal responsibility for their choice of career and for their success in it, and to minimize interference with education.

Copies of the guide can be purchased from the ASEE, University of Illinois, Urbana, Ill., for 10 cents each. Lots of 25 are $1, and 100 copies are $3.

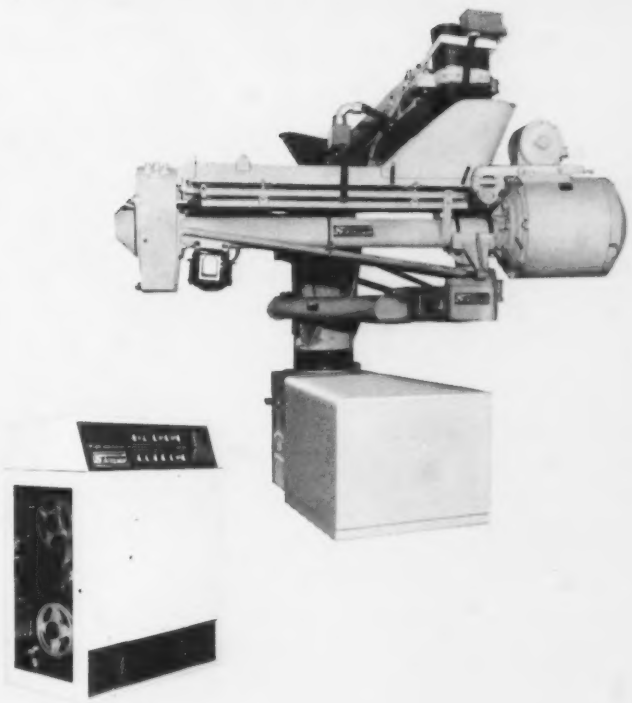
Beardsley & Piper **RESEARCH** Saves You Money...

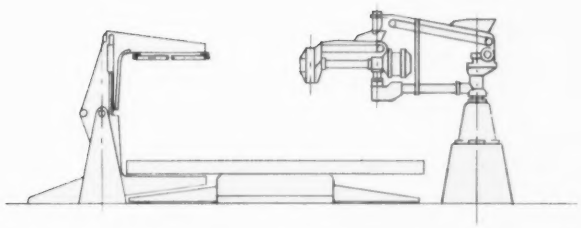
Top Productive Efficiency With

THE AUTOSLINGER

The Slinger With A Memory

- Outstanding precision and uniformity mold after mold
- Completely automatic—using Micro-Path magnetic tape control
- Instant tape changes—no lost production
- Compact magnetic tape—no storage problem
- Auxiliary signals control sand feed, turntable indexing and other operations





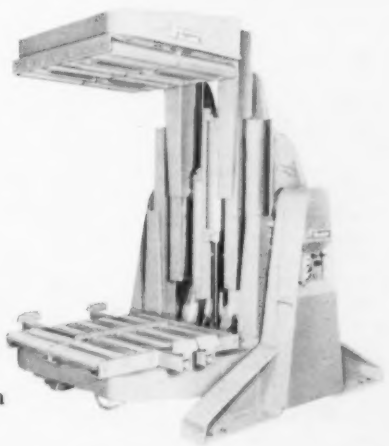
HYDRA-MOLD UNIT

Maximum Productivity—Minimum Space And No Pits

The New Standard of Performance

- Four-station productivity with one-station sand system
- Faster, more accurate index
- Interlocking construction . . . compact design
- Multiple-station production for production *and* jobbing work
- No pits of any kind

COMPACT ROL-A-DRAW



- Superbly clean design
- Capacities to 15,000 lbs.
- Faster cycles . . . easier operation
- Costs less to install, less to maintain
- Rugged construction for rigidity and durability

BEARDSLEY & PIPER Div. of Pettibone Mulliken Corp.
2424 N. Cicero Ave., Chicago 39, Ill.

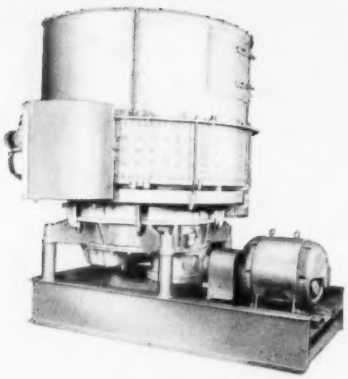
FEMA

From B & P **RESEARCH**

the most complete line of mullors and mixers for your sand preparation needs

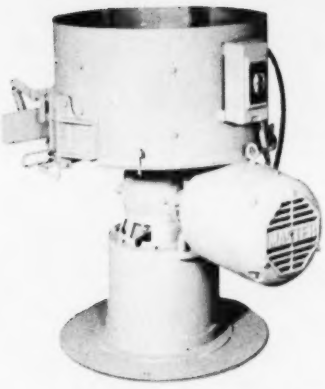
MULBARO

- The only really portable mullor
- Fast, thorough sand preparation
- Molding—core—shell—CO_2 or air-hardening sand
- Low initial cost . . . low operating cost
- No sand rehandling—several barrows can be used with one mulling unit



SPEEDMULLOR

- Lowest total cost per ton of prepared sand
- Minimum time cycles mean lower power costs
- Speedmullor cooling improves sand properties
- Optional Mulltrolmatic assures the ultimate in control and accuracy
- Compact Speedmullor-Preparator units for maximum sand conditioning capacity in minimum space



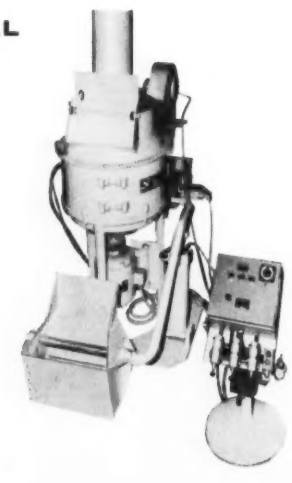
WHIRLMIX

- Fast, thorough blending of CO_2 (silicate of soda), air-setting, resin, core oil and other sand binders which do not require wheel mulling
- Compact and low cost—economical to operate
- Replaceable blades and arm shoes
- Easy discharge of sand—easy cleaning

B & P For The Broadest, Most Flexible Line of Coating Equipment For Shell Sand

SHELL MULL-ALL PACKAGE UNIT

- Thoroughly coats shell sand at minimum cost
- Cold process or preheat process resin-coated shell sand
- Mulltrol automatic control assures batch after batch uniformity
- Greatest capacity in its field
- A complete, ready to operate package . . . easily installed . . . no pits



HP SHELL SAND SPEEDMULLOR

- The ONLY mullor that resin-coats sand by all processes
- Shortest cycle by far
- Four times faster than any other mullor
- Highest physical properties
- Most capacity per dollar invested

B & P FOR THE MOST COMPLETE LINE OF FOUNDRY EQUIPMENT—
AUTOSLINGER ● SANDSLINGER ● SPEEDSLINGER ● HYDRA-SLINGER ● SPEEDMULLOR ● PREPARATOR ● SPEEDMULLOR-PREPARATOR UNIT ● SHELL SPEEDMULLOR ● MULL-ALL ● MULBARO ● LAB MULBARO ● PNEU-RECLAIM ● FORMATIC SHELL MOLD UNIT ●

see highlights of the latest B & P research

From B & P **RESEARCH** hard uniform cores made with existing core boxes

A Complete Line Of The World's Fastest Selling Coreblowers

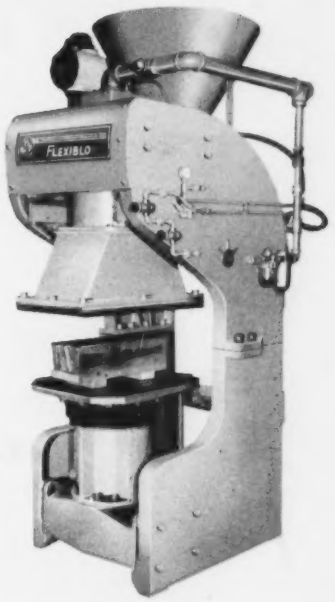
core handling equipment for every need

B & P NCR ROL-A-COR

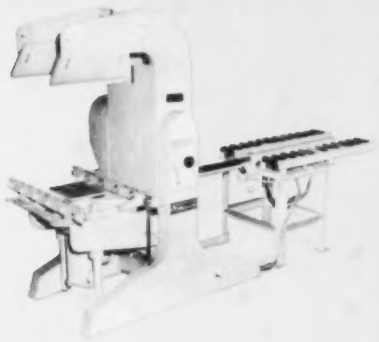
For Jobbing And Semi-Production Requirements

FLEXIBLO

- From a few ounces to 400 pounds capacity
- Extra large combination blow and exhaust valve
- Simple pneumatic automatic sequence control
- Proved safest—minimum maintenance
- Fast, smooth, vertical clamping with combination piston-diaphragm design
- Handles any core box—wood or metal
- Blows all types of core sands
- Balanced, versatile design for production or jobbing work
- Choice of semi-automatic or fully automatic operation



CB15 FLEXIBLO

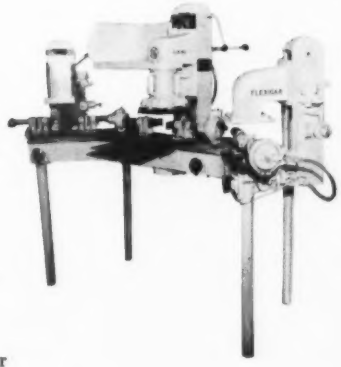


- Cuts core room handling costs
- Fast handling—accurate draws with either automatic or semi-automatic push button control
- Fast, 7 to 10 second complete rollover cycle
- Handles a wide range of core boxes
- Maximum flexibility—roll-in and roll-out conveyors can be mounted for 90° or straight away core box travel

For production requirements—precise rapid draws with B & P TR Rol-A-Cor.

FLEXIGAS FOR THE CO_2 PROCESS

- New package unit for maximum efficiency
- 2 FG 5-10 gassing units and one CB5 provide a balanced operation
- Fast, low cost production of CO_2 cores
- Adjustable gassing time from 0 to 30 seconds
- Handles any core box varying up to 4" in height without machine adjustments
- Flexigas units have single push-button operation—automatic sequence control
- FG 5-10 Flexigas available in package unit or separately
- FG 12-20 available for larger work—choice of 2 types of automatic horizontal clamps for gassing vertically parted core boxes



PNEU-RECLAIM

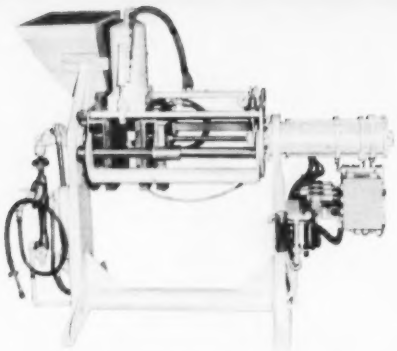
Sand Reclamation You Can Afford

- Lowest installation cost
- Easy maintenance
- Lower operating cost because of low power requirements
- Exact fines-control built in

CORMATIC SHELL CORE UNIT ● FLEXIBLO ● SAN-BLO ● WHIRLMIX ● ROL-A-DRAW ● ROTO-MOLD ● ROTO-FEED ● HYDRA-MOLD ● BEEP ● SKIPTROL ● MULLTROL ● MULLTROLMATIC ● BLOMATIC ● CORMATIC ● NITE GANG ● MAGNARATOR ● FOUNDRY-MITES

developments at the AFS Foundry Show

From B & P **RESEARCH** hollow shell cores and molds of unmatched accuracy

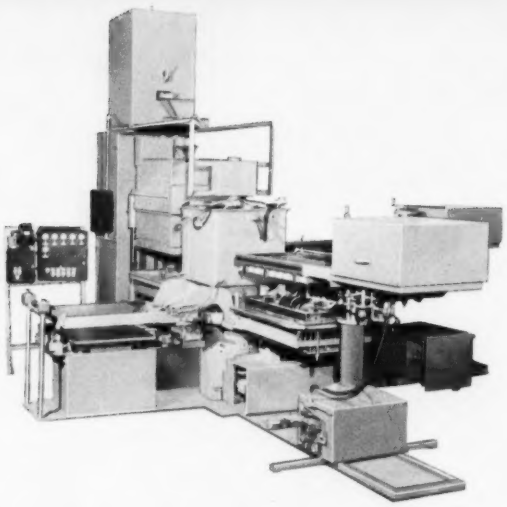


SF-6A CORMATIC

Makes Better Hollow Shell Cores Faster And At Less Cost

- Completely automatic—single push of button actuates entire cycle
- Largest core box capacity of any machine in its class
- Highest BTU output—greater than similar machines by as much as two to one—assures faster curing
- One man operates three SF-6A Cormatics—strips up to 240 boxes per hour

The SF-6 Cormatic...The low Cost, Easy To Operate Hollow Shell Core Unit identical to the automatic Cormatic in core box capacity with the same high heat output and temperature control.



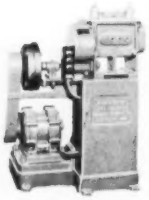
FORMATIC SHELL MOLD MACHINE

- Maximum productivity with minimum floor space
- Maximum flexibility for every production requirement
- One, two, three or four pattern units
- Automatic operation—every essential factor is precisely controlled
- Enlarge as required—package design

THE FOUNDRY MITES

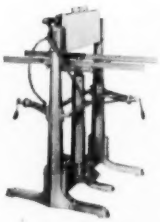
SCREENARATORS

WIRE CUTTERS



WIRE STRAIGHTENERS

JOLT SQUEEZE MACHINES



VIBRA-DRAWS

ELECTRIC RIDDLES

A Line Of Flexible Machinery That Is Ideal For Small Jobs In Large Foundries And Large Jobs In Small Foundries

Performs 1001 Foundry Jobs Efficiently—Economically

see B & P's money savers at the AFS Foundry Show

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"A successful foundry knows more than how to make good castings. It also knows the language and needs of the specialized client"

Care and Feeding of Infant Foundries

● FOR SOME REASON or other, I always have had a fanatical interest in just how successful foundries got started in the first place—in that mysterious something which saw them through the critical period of high infant mortality which strikes many newly born babes.

So far my findings have been confusing, to say the least. Some infant foundries pass out in spite of well heeled, doting parents with influence, business book learning, good housing and furnishings, silver spoons, and all. On the other hand, some anemic looking foundry babes—born in the slums, so to speak, during an epidemic—with three strikes against them, seem to have some sort of white corpuscles racing through their veins which immunize them from disease and keep them alive, growing, and going to town.

So far as I can find out, these seemingly indestructible babes have no particular tricks up their sleeves —no secret formulas, pat business strategy, or preponderance of luck. But their roots seem to take hold, and by slow, steady growth they live through drought, blossom forth, and bear fruit.

Upcoming Upholsters — On the train last week, headed for a speaking engagement, I met up with two young fellows so steamed up about their business that before I knew it I was up to my ears with interest, learning what they were up to, how they were going about it, and how happy they were with the progress they were making. Before we reached our destination, I was committed to a trip through their brand new office building and plant, which have nothing to do with the foundry industry.

They manufacture all sorts of fiber products for the upholstery business—thread-braided paper rope of many sizes; insulating bolsters and pads; flat, thick paper ribbons; and a flock of other supplies, the like of which I had never seen. All are destined for the upholstery of furniture and automobiles.

During my visit, I saw some ingenious and obviously handmade special machinery, but by far the biggest part of the equipment definitely was conventional and of a type I frequently had seen in plants devoted to products far afield from theirs.

Rearing an infant foundry

In quizzing these people as to what in the name of heaven ever possessed them to sink their money in such a narrow, highly specialized fragment of the highly specialized upholstery business, I found that they had no invention or revolutionary development to offer which would justify their breaking into a well established and highly competitive market. In fact, they had had little production experience in this field.

Stubbornly pursuing my quest as to how they got started, I learned that the three founders had been born and raised, vocationally, in the world of upholstery and upholstery supplies. They had learned its most peculiar language, its lore, its way of doing and thinking, and its pitfalls. Through years of cut-and-try experience, plus proven accomplishment, they had been elected to the inner circles of this highly restricted cult.

Even though they had no revolutionary product or outstanding price advantage to offer, they found that their clientele chose them because they were in the know, could speak the lingo, and could understand the clients' peculiar and specific needs in less time and with less effort than foreigners offering miracle products at a discount. This reason, they said, was the

main one that their business started, took hold, and grew healthily.

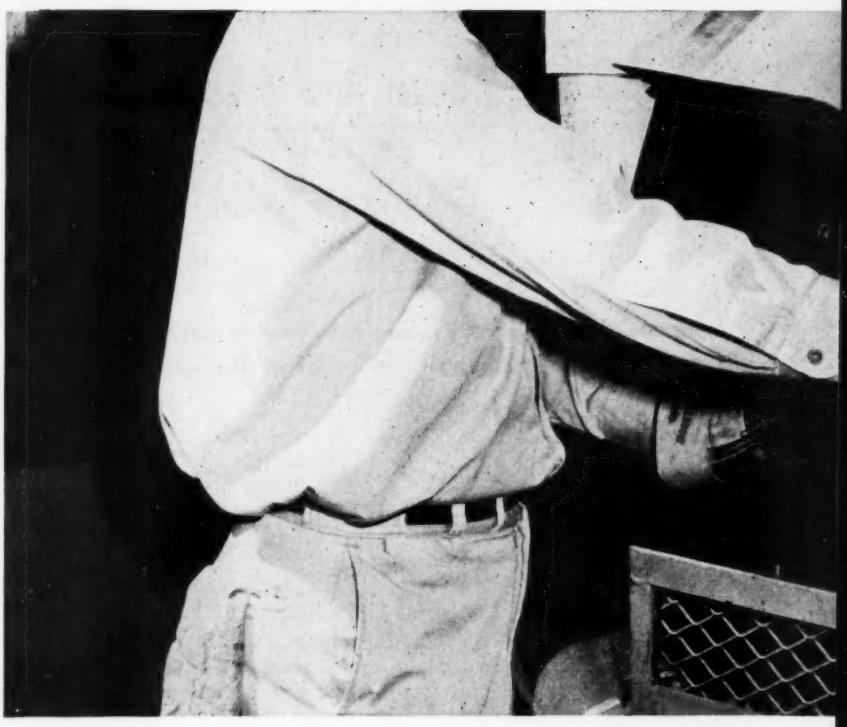
Getting To Know Them — For quite some time now, the Lee Hobby Foundry has been doodling around with the development of a tensile tester for molding sand which involves plastic or rubber sensing units. Paralleling this project has been our pioneering of the diaphragm molding machine. The only reason for mentioning these is that plastic or rubber is involved in both.

Since we could not buy the rubber units we needed, we had to learn how to make them ourselves through two or three years of rugged apprenticeship. During this apprenticeship, we became acquainted with a number of plastic firms in the industrial neighborhood which previously we didn't know existed.

Upon learning of our little foundry, one of these firms asked us to make a pattern and several cast forms for rubber dipping, which we did to the company's satisfaction. This job started a chain reaction which over several years has led to our making over 300 other castings for them. This past week, an order came in for another pattern setup and 200 castings. Several other plastic firms in the neighborhood heard about our work in this field, asked for help, got it, and are threatening us with more jobs.

I must admit that this recital is tinged with bragging, but the point I have in mind is this: Although we do pride ourselves on trying our best to turn out sound castings with the smooth finish essential to the plastic processes, I don't believe that it's the superiority of our product which attracted our plastic processing firms. And I feel certain that it could not be a price advantage since we work on a small scale and mostly by hand. So the reason must be that we have served an apprenticeship in rubber dipping and curing, have developed a highly accented and limited vocabulary in the lingo, and have proved our understanding of their peculiar needs.

Know Thy Customer—Reviewing my notes regarding the conception, pregnancy, birth, and rearing of an infant foundry, I can't avoid the conclusion that survival and growth to maturity has been due as much



ONE EVERY 30 SECONDS—Mold halves bonded with Durez resin come off this four-station shell molding

Which shell-mold resin is right for high-volume foundry?

Step into one of the country's most highly mechanized foundries and look around.

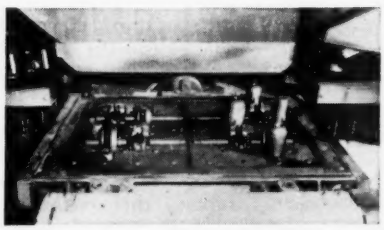
It's a 100% shell-mold operation. It was designed specifically to turn out steel crankshafts for Evinrude outboard motors. High piece volume, low tonnage: in its class, it's a model plant.

This foundry uses Durez resins exclusively for shell molds. Evinrude foundrymen get dependable production with Durez. It lets machines work at top capacity. It's always dependable—from shipment to shipment, from month to month.

Your experienced Durez man can show you what Durez uniformity means to you—in terms of more production shell-mold operations in your own foundry. He can point out how you get less of *every* shell-molding problem when you work with Durez resins—and more of the accuracy and speed that shell molding gives you. Call him in soon.

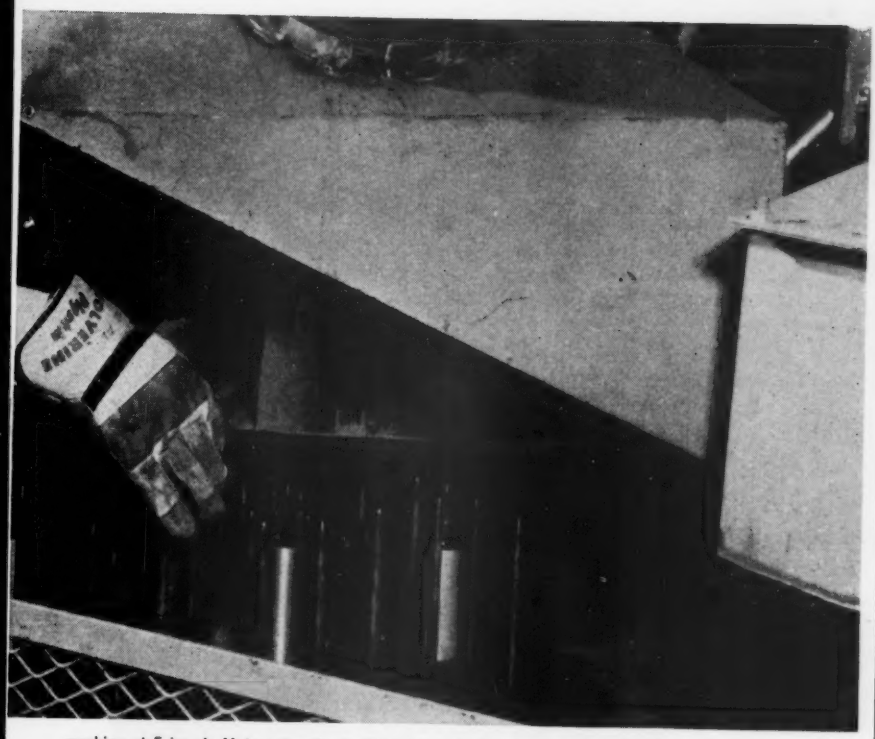
New 32-page "Guide to Shell Molding"
Complete manual—recommendations on patterns, materials, temperatures, mixing, lubricants, molds, cores. Yours free—just write for it.

SEE YOU at the AFS Exposition—Booth 527

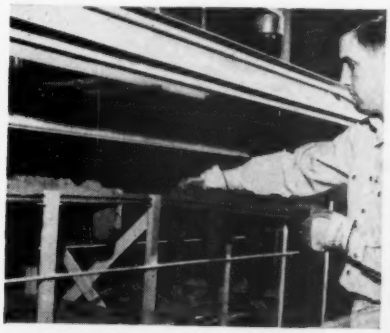


1. PATTERN produces cope and drag at the same time. Link-Belt molding unit has four patterns which rotate into position automatically.

2. DRAG HALF of mold, left, goes to belt conveyor for core setting. Cope goes directly to closing machine, which is synchronized with shell-molding unit.



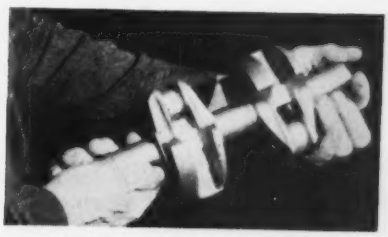
machine at Evinrude Motors foundry in Milwaukee. Production rate is 120 molds per hour.



3. CLOSED MOLDS go first to one of 52 storage cars that can hold 832 molds . . .

5. MELTING is continuous, with a tap ready every 20 minutes. Pouring platform travels at same speed as mold conveyor.

4. . . . then out of storage to trays of overhead trolley conveyor onto which backing sand has been vibrated automatically.



6. SHOT-BLASTED, HEAT-TREATED CASTING needs very little machining, uses less steel than previous forging, and has better wearing qualities.

DUREZ PLASTICS DIVISION

1005 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS

to the slowly accumulated knowledge of the craft of the specialized client and his language, needs, and values as it is to a knowledge of the highly specialized, intricate, and demanding foundry science. Of course, both types of knowledge are needed to leave a trail of satisfactorily completed jobs in a customer relationship. This satisfaction provides a bargain to both parties and insures future business.

So far as I can see, there has to be a reason for starting a foundry other than a desire to make money, important as black ink is. Having your own business isn't enough, nor is being your own boss or just liking foundry work. So it would seem that a successful apprenticeship in every phase of the foundry business is just the beginning of preparation for success as parents of healthily matured foundries.

Contest Seeks New Uses For Copper-Base Castings

"First Annual Brass and Bronze Casting Progress Awards" is a competition for best suggestions for new or projected uses for bronze or brass castings. It is sponsored by the Brass and Bronze Ingot Institute.

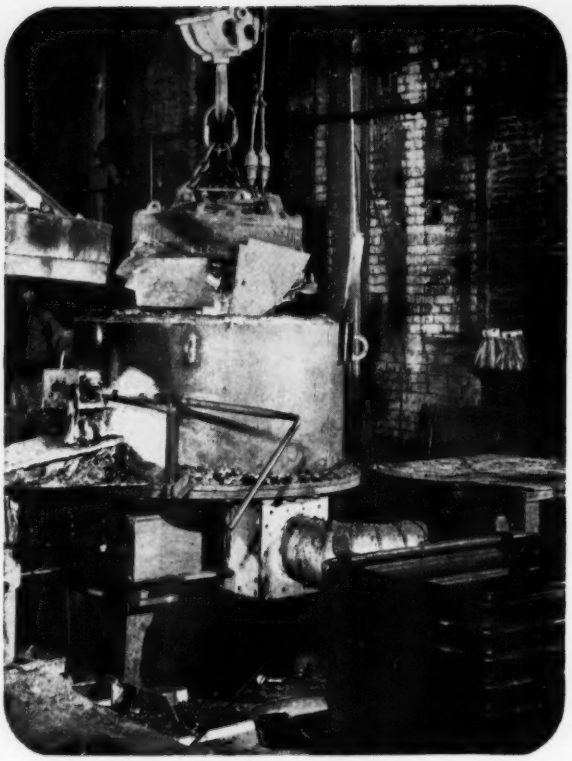
Awards are designed to increase awareness of new properties of various copper-base castings discovered through extensive research at Battelle Memorial Institute. Two series of awards will be made. The "Progress '60" award offers first prize of $500 and a suitable trophy for the best new suggested use for a brass or bronze casting, for use of a brass or bronze casting as a substitute for other material in an existing product or part, or for improvement in design or efficiency of brass or bronze casting already in use.

The "Projection '60" award offers the same prizes for ideas that project new uses, substitutions, or improvements of brass or bronze castings. Four other prizes also will be awarded.

The competition is open to anyone in the United States except members of the Institute or their employees. Deadline for entries is June 15, 1960. Entry blanks and descriptive folder are available from the Brass & Bronze Ingot Institute, 300 W. Washington St., Chicago 6, Ill.

Circle 672 on Page 53

5 ways to make your foundry more efficient with OHIO MAGNETS

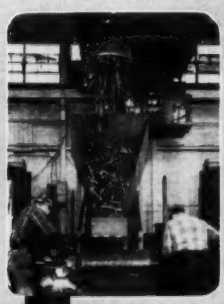


1 CHARGING FURNACE. One 36-inch Ohio Bolted Magnet charges six 375 KW furnaces giving 240 500-pound heats each 24 hours.

2 SCRAP HANDLING. All scrap is handled efficiently, economically with Ohio Magnet. Single 36-inch magnet replaces grapple, clamshell, bucket or lift truck.

3 SORTING. Castings are conveyed from Wheelabrator to hard-iron inspection. Ohio Magnet picks parts out of sorting bins.

4 UNLOADING ANNEALING FURNACE now takes one man 10 to 20 minutes with Ohio Magnet. Lift truck used to take 1 to 2 hours.



5 LOADING GRINDING HOPPER after conveying parts from inspection department. Same Ohio Magnet is used for operations shown in photos 3, 4 and 5.

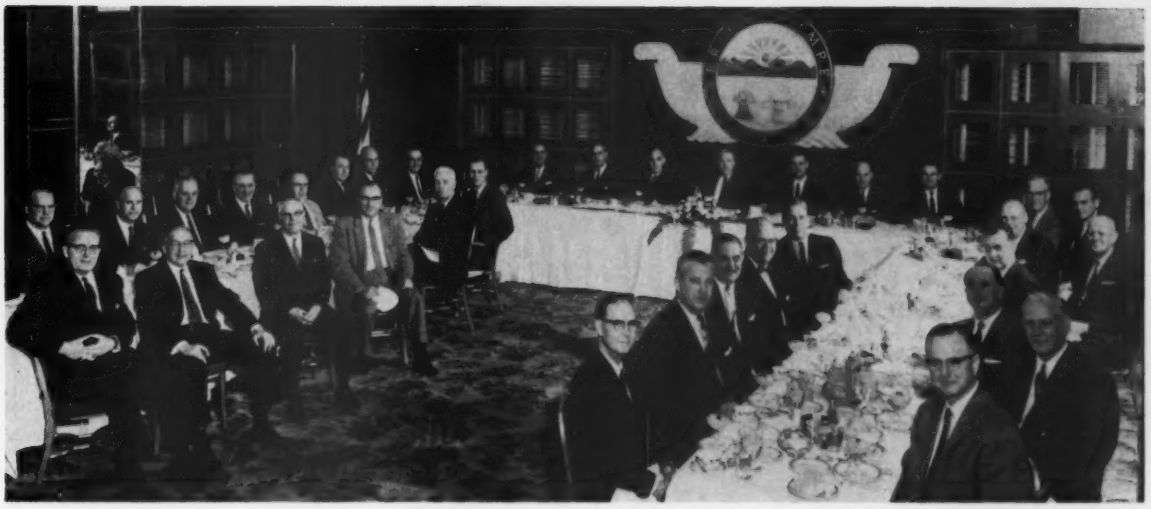
Photos: Courtesy I-F Manufacturing Company, New Philadelphia, Ohio

ohio ELECTRIC

Small foundry or large, magnetic materials handling points the way to higher productivity, higher efficiency. And with Ohio Magnets on the job you get high availability, too. That's because Ohio Magnets are built with that extra margin of safety that means long, service-free life. Yes, *magnetic materials handling pays—especially with Ohio Magnets.*

Visit us at Booth 408
AFS Castings Congress and Exposition

THE OHIO ELECTRIC MFG. CO.
5400 Dunham Road • Maple Heights • Ohio
Subsidiary of Howell Electric Motors Company



Present and past officers and trustees of the Foundry Educational Foundation hold annual Alumni Dinner prior to opening of College-Industry Conference

Discussion of Engineering Sciences Features . . .

FEF ANNUAL CONFERENCE

By WILLIAM G. GUDE
Managing Editor

● THE RELATIONSHIP of basic engineering sciences to cast metals and to the casting process provided the theme for a group of seven papers presented at the thirteenth annual College-Industry Conference of the Foundry Educational Foundation.

The conference, held at Hotel Statler-Hilton, Cleveland, March 16-17, attracted an attendance of about 150 educators and foundry industrialists. It also was the occasion for the annual business meeting of the FEF.

In presiding at the opening session of the conference, FEF President Frank G. Steinebach, editor, FOUNDRY, pointed out that the theme selected for this year's discussions reflected the trend in education toward the emphasis on basic sciences and engineering. Accompanying this trend has been a curtailment or elimination of laboratory courses which previously provided the engineering student with knowledge of the application of basic foundry principles.

One of the most pressing problems today, Mr. Steinebach said, is that of presenting adequately to the engineering student the opportunities of the foundry industry.

Foundation Activities—The following statistics were presented as one measure of FEF activities during the past year:

1. Cast metals laboratories. FEF schools last year invested at least $56,000 in additions to their laboratories, and several schools are completing plans for new foundry facilities costing hundreds of thousands of dollars.

2. Cast metals courses. FEF schools have a total of 104 courses partially or entirely devoted to cast

R. B. Parker, left, American Brake Shoe Co., and David H. Morgan, Dow Chemical Co., new president and vice president, respectively, of FEF

metals. This is a slight reduction from the previous year, the result of consolidation of some courses.

3. Teaching staffs. FEF schools have 43 professors engaged in teaching foundry courses, with 28 instructors and 12 craft instructors also on foundry staffs. These figures are about the same as the year before.

4. In the 1959-60 school year, 4864 students took foundry courses at FEF schools.

5. FEF student registration during the current school year totals 601. Included in this total are 119 students holding scholarships from the FEF. It is expected that 122 scholarships will be awarded during the second semester. Average dollar value of these scholarships during the school year was $386.

6. Of the 190 graduates of the class of 1959 shown on FEF placement listings, 106 were employed by companies which operate foundries or by firms which supply and equip the foundry industry. An additional 28 FEF graduates went on to study for advanced degrees, and 32 went to companies not connected with the production of castings, although in many cases they are castings users. The remainder went to other fields, including research institutions, government agencies, and military service.

7. Companies participating in the employment opportunity survey conducted annually by the FEF, listed a total of 1754 jobs available for 1960 graduates.

8. During the past year eight $1500 Wheelabrator fellowships were awarded, bringing the total of such awards since this program was instituted to 20.

Dean Curtis L. Wilson, Missouri School of Mines, luncheon speaker

Officers and Trustees—In the annual election of officers, R. B. Parker, assistant to the president, American Brake Shoe Co., New York, was named president to succeed Mr. Steinebach. Newly elected vice president is David H. Morgan, director of college relations, Dow Chemical Co., Midland, Mich., and former president of A and M College of Texas. Other officers elected are Anton Dorfmueller Jr., Archer-Daniels-Midland Co., Cleveland, secretary; E. M. Knapp, Ferro Foundry & Machine Co., Cleveland, treasurer, and E. J. Walsh, executive director.

The following were chosen as trustees - at - large for three - year terms: K. R. Daniel, vice president, American Cast Iron Pipe Co., Birmingham; W. H. Muchnic, president, LFM Mfg. Co., Atchison, Kans.; S. S. Robinson, Pickands Mather & Co., Cleveland; H. G. Stenberg, foundry superintendent, Draper Corp., Hopedale, Mass.; H. M. Winterson, vice president, Blaw-Knox Co., Pittsburgh. As immediate past president, Mr. Steinebach will serve as a trustee for one year.

The following have been appointed by founding member societies as trustees for two-year terms: American Foundrymen's Society, N. N. Amrhein, president, Federal Malleable Co., Milwaukee; Foundry Equipment Manufacturers Association, R. A. Brackett, executive vice president, Spencer Turbine Co., Hartford, Conn.; Gray Iron Founders' Society, Andre Renard, 1st vice president, Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Malleable Founders' Society, L. E. Roby, vice president, Peoria Malleable Castings Co., Peoria, Ill.; Non-Ferrous Founders' Society, W. O. Larson Jr., president, W. O. Larson Foundry Co., Grafton, Ohio; Steel Founders' Society of America, J. J. Ewens, vice president, Grede Foundries Inc., Milwaukee.

Trends in Education — Speaking at the opening day's luncheon, Dean Curtis L. Wilson, Missouri School of Mines and Metallurgy, pointed out that the country's wealth depends on its scientific knowledge and capacity to use it. To further this development requires engineers, but these engineers also have both social and spiritual responsibilities.

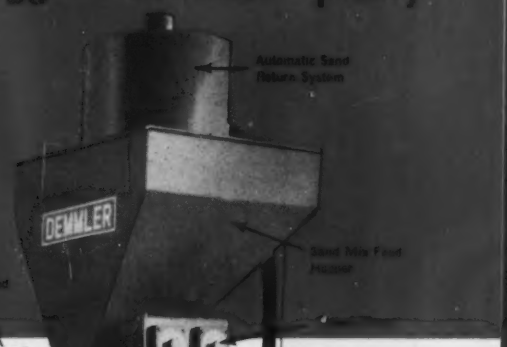
Dean Wilson was a member of the American Society for Engineering Education committee which, in 1955, presented its report suggesting greater emphasis on the basic and engineering sciences. The committee recommended that one-half

Breakfast meeting of FEF school professors and trustees during the conference

a low-cost, true shell core blower of rugged Demmler quality

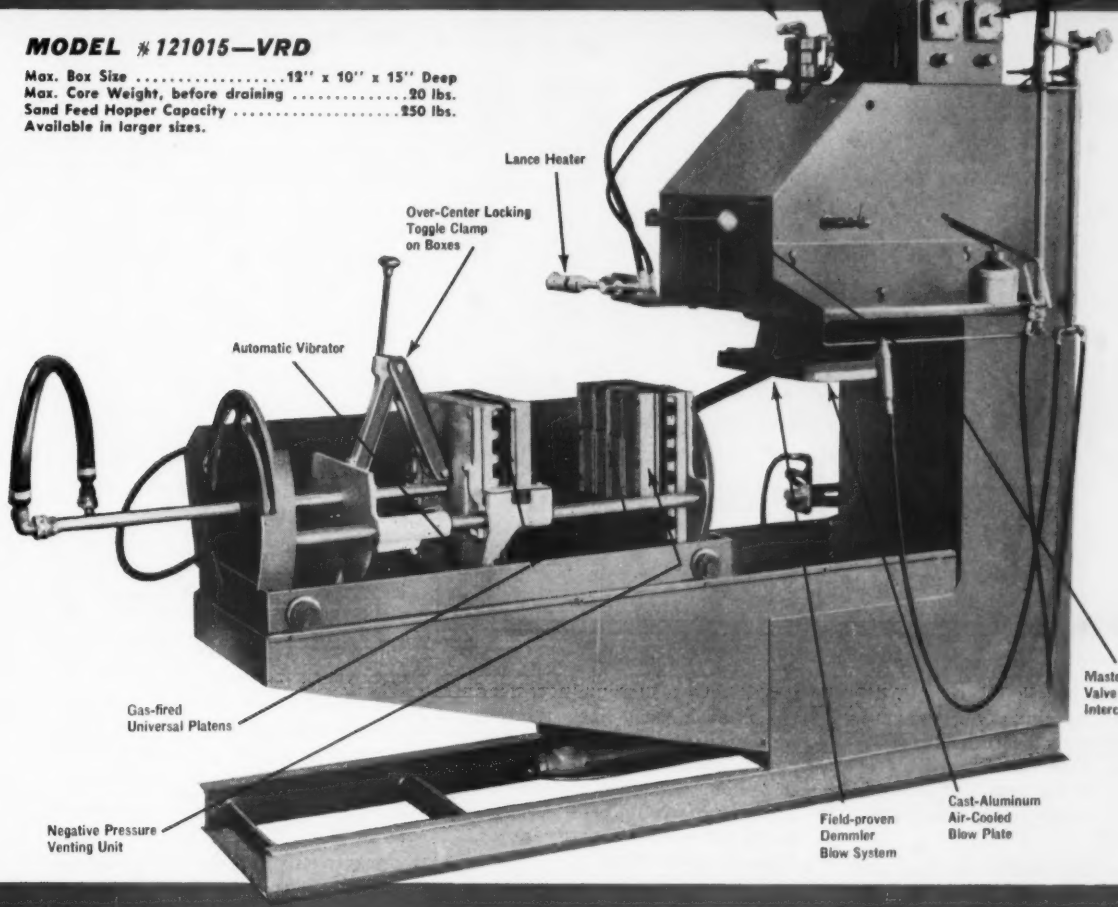
DEMMLER

"Utility" Semi-Automatic SHELL CORE BLOWERS



MODEL #121015—VRD

Max. Box Size .....12" x 10" x 15" Deep
Max. Core Weight, before draining .....20 lbs.
Sand Feed Hopper Capacity .....250 lbs.
Available in larger sizes.



MORE FOR YOUR FOUNDRY DOLLAR

TYPICAL CORES SUITABLE FOR PRODUCTION ON THE "UTILITY" SHELL CORE BLOWER.

VISIT US AT BOOTH #1525 CASTINGS CONGRESS & EXPOSITION PHILADELPHIA — MAY 9-13

OPERATING FEATURES:

1. Sand fed automatically from feed hopper into blow magazine. Hopper can be replenished without stopping production.
2. Over-center toggle lock for positive box closing and opening.
3. Master control lever shuttles box under blow head, clamps it, blows, unclamps and shuttles box to rollover drain position.
4. Rollover designed so that weight of boxes remain within the radius of rotation . . . no out of balance weight to struggle with.
5. Vibration applied to boxes automatically in rolledover drain position for consistency of core wall thickness.

Circle 674 on Page 53

DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS

lasts *over twice* as long as other belts!

Handling hot shakeout sand demands a belt that is really rugged. That is why a 355 ft. length of 30" x 7 ply Super-Insulated Sahara* is used for this gruelling sand reclaiming operation at this tractor foundry.

This belting thrives on heat and abrasion that kill off other belts 2 to 5 times faster . . . does a better job at far less cost to you.

Its special INNERLOCKED* construction of heavy-duty hard silver duck, long-fiber asbestos insulation, and exclusive impregnating compounds will give you maximum resistance to temperatures up to 600 degrees. Let Imperial solve your foundry needs. Time to start—Now.

Phone or write for complete information on how Imperial's Super-Insulated Sahara* can serve you better . . . cost you less.

**Registered trademarks of Imperial Belting Co.*

You expect MORE from Imperial . . . and you get MORE!

Imperial INNERLOCKED® BELTING

First in stitched canvas belting for over 50 years

MAIL FOR HELPFUL DATA

Imperial Belting Co.
1760 S. Kilbourn Ave., Chicago 23, Ill.

( ) I'd like a free belting survey of my plant

( ) Please send your catalog and engineering handbook.

Name_____

Company_____

Address_____

of the curriculum be devoted to these sciences and an additional one-fourth to engineering analysis. Dean Wilson feels that this curriculum should increase the effectiveness of education, but he added that the most important factor in engineering education is the quality of the faculty.

Speaking on "Production Engineering," Prof. E. P. DeGarmo, University of California, indicated that the pendulum has swung too far toward emphasis on the sciences. Today, he said, students know less about manufacturing processes and receive less training in them than ever before.

Professor DeGarmo related that a study of curriculum in Russian engineering schools shows that considerably more time is devoted there to graphic and manufacturing processes than is true in the United States. This arrangement is possible because Russian engineering courses cover five years compared with four years for most American schools. On the other hand, training in law, medicine, and other professions gradually has been extended in this country in recent years. Professor DeGarmo described a concentrated course in manufacturing processes which has been instituted with success at the University of California.

Engineering Sciences — How the engineering sciences affect foundry practice and cast metals as engineering materials was described in comprehensive papers prepared by professors from various FEF schools.

"Mechanics of Solids" was treated by Prof. M. C. Flemings, Massachusetts Institute of Technology. Topics covered included stresses, plastic deformation, impact properties, stress analysis, fatigue, corrosion, and casting design.

Application of the basic data for fluid mechanics to foundry practice was explained by Prof. J. F. Wallace, Case Institute of Technology.

Laboratory work done by students to demonstrate the principles of heat and mass transfer was discussed by Prof. R. A. Flinn, University of Michigan.

Examples of the application of thermodynamics for the solution of foundry problems were included in a paper by Prof. P. C. Rosenthal, University of Wisconsin, which was

Circle 675 on Page 53

NEW! ANSCO SUPERPAK

for the first time, a new x-ray film packaging that saves time and lowers costs at no sacrifice in quality.

Interrupting operations to open small quantities of X-ray film? Handling many small packages and wrappings? Never again with Ansco SUPERPAK. New Ansco SUPERPAK® is the modern way to increase your efficiency through 600 non-interleaved sheet or 300 interleaved sheet packages of Superay 'A' or Superay 'B'.

Whenever the storage bins (SUPERPAK fits standard film storage bins) need refilling, pause for a moment to open SUPERPAK, work on until the job is completed without further interruptions. Just think of the savings in man-hours and money through this new, sensible method of packaging.

Ansco
Superpak

From every point of view; money, time and general efficiency . . . it makes sense to use SUPERPAK. Ansco, Binghamton, N. Y., A Division of General Aniline and Film Corporation, Manufacturer of World Famous Superay X-ray Films.

Whatever you cast...

Comes out better with

KOPPERS *Premium Foundry Coke*

You'll have fewer rejects—far better quality castings when you switch to Koppers Premium Foundry Coke. Car after car, Koppers delivers a superior coke that's absolutely *uniform* in *size, strength, structure* and *chemical analysis.* Because of the higher carbon content in Koppers Premium Foundry Coke, the foundryman can maintain a higher temperature range which increases the cleanliness of the iron. This in turn, helps reduce fuel consumption—means lower operating costs all around. Next time order Koppers Premium Foundry Coke. Available anywhere in the U.S. or Canada in sizes to meet your needs. Koppers Company, Inc., Pittsburgh, Pa.

WE CHECK EACH DAY'S RUN to make certain you get foundry coke of the exact size and chemistry that is most efficient for the job. Analyses are available to your foundry on request.

presented by Prof. R. W. Heine. This paper covered the attainment of equilibrium in melting reactions, the removal of impurities during melting, deoxidation, solution and removal of gases from molten metals, and the solidification process.

Discussing "Engineering Analysis and Design," Prof. B. W. Niebel, Pennsylvania State University, said that the main factors to be considered in any engineering design are function of the part, its eye appeal, ease of maintenance, and cost. The process selected for production of the part should be based on the one best adapted to the design and the volume involved.

Electrical sciences and engineering both are important to foundries, it was pointed out by Prof. M. S. Burton, Cornell University. Important applications include heating and melting, and nondestructive testing and inspection such as x-ray, microradiography, and spectrography.

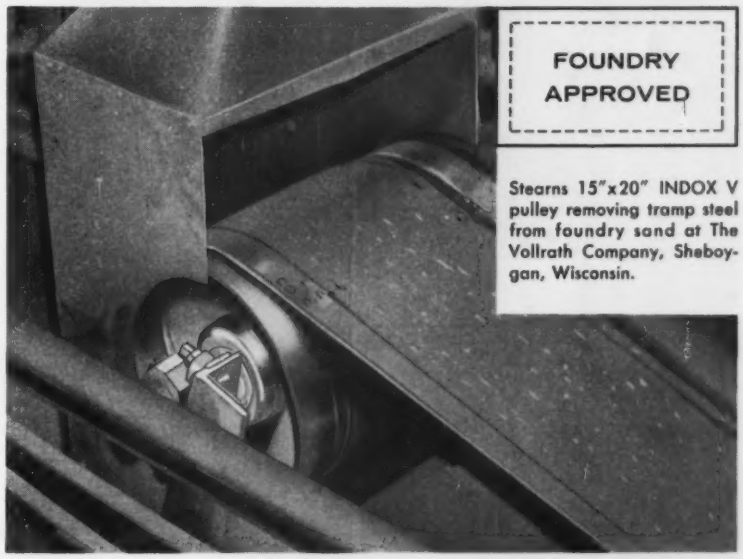
"Nature and Properties of Materials" by Prof. R. E. Swift, University of Kentucky, covered the relation of atomic, particle, and aggregate structures to properties of materials. The paper also pointed out the effect of structure on properties of materials as they relate to quality of castings.

Practical applications of engineering science in the modern foundry were described by Elmer E. Braun, works manager, Central Foundry Division, General Motors Corp., at the luncheon concluding the conference.

Among the applications discussed were such new control mediums as

"He pays good wages, but he works us like dogs"

Stearns INDOX V* permanent magnet pulleys give you job-proved protection



FOUNDRY APPROVED

Stearns 15"x20" INDOX V pulley removing tramp steel from foundry sand at The Vollrath Company, Sheboygan, Wisconsin.

for example: at THE VOLLRATH COMPANY...

... Metallurgical Engineer, James Behring, states—"Our new sand reprocessing system with the Stearns INDOX pulley has substantially reduced our backup sand cost and has almost eliminated muller maintenance expense."

Mr. Behring went on to say, "In the past, most of our used sand was discarded, except where large quantities of backup sand were required for larger castings. In these cases, the larger pieces of core wire and other tramp iron which could cause damage or injury were removed by hand. When this sand was remixed in the muller, however, the smaller undetected pieces caused considerable damage to the unit's walls and mixing wheels. Now, with our new sand reprocessing system in operation, *all* used sand can be salvaged and muller damage is eliminated. The savings we've made in sand, labor and maintenance are substantial."

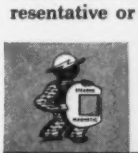
This application is typical of the increasing use of ceramic permanent magnet pulleys in foundry sand systems. And again — Stearns leads the field with the only *job-proved* ceramic magnet pulley — the INDOX V.

Consider these important advantages: high capacity, lower initial cost, no power expense, no chance of power failure, no need for rectifier, no moisture problem, minimum maintenance requirements — none of the inherent disadvantages of electromagnetic pulleys which were previously the standard for foundry use.

12" to 48" diameters in 2 capacities.

*Amazing oriented ceramic magnet material used exclusively by Stearns. Extremely high energy product — light in weight — low in cost.

FOR ALL THE FACTS — call your local Stearns representative or write for free Bulletin No. 1022 G — a new fact-filled booklet containing complete specifications and easy-to-use selection chart.



See us at the FOUNDRY SHOW May 9-13 • Visit us at Booth 209

STEARNS MAGNETIC PRODUCTS

DIVISION OF INDIANA GENERAL CORPORATION • VALPARAISO, INDIANA

635 South 28th Street • Milwaukee 46, Wisconsin

Profit with Stearns — First with Ceramic Magnet Separators for Industry

Circle 678 on Page 53

TOUSEY
VARNISH
COMPANY
Kay Lovelace Smith

Our 75th year

CHAPTER ONE

The Constitution of the United States was a brief 110 years old when Chester A. Tousey founded the Tousey Varnish Co. in 1885.

The great Chicago fire had become history and a new faith in the future of this midwest metropolis was flourishing. Mr. Tousey was possessed with an abundance of this belief when he constructed his modest plant at 560 South Canal Street. He comprised the entire staff in the beginning, producing, delivering and selling Tousey products.

The next ten years passed rapidly, increased sales and managerial problems brought an expanded staff and need for large quarters. Thus in 1895, the company moved into a new establishment at 520 West 25th Street.

The pattern of expansion in both personnel and production facilities continued. New products were added to the ever growing line and close to the turn of the century a laboratory was set up and operated on a full-time basis for product research. A three story building was added to the existing plant and large storage tanks were placed underground.

Thus Tousey, with these evidences of a healthy growing company passed through the first stages of its history.

Individual attention to customers' needs, dedication to the manufacturing of quality products and a sincere effort to maintain these standards at all times proved a successful formula for expansion.

(to be continued)

Tousey Varnish Co. manufactures a full line of finishes for application by Dipping, Flo-coating, Hot Dipping, Automatic Spray, Electrostatic Spray, Airless and Hot Spray. Tousey is a major supplier of finishes to manufacturers of Farm Machinery, Road and Construction Machinery, Automobile and Trucks, also representative manufacturers of products made of metal.

TOUSEY VARNISH COMPANY

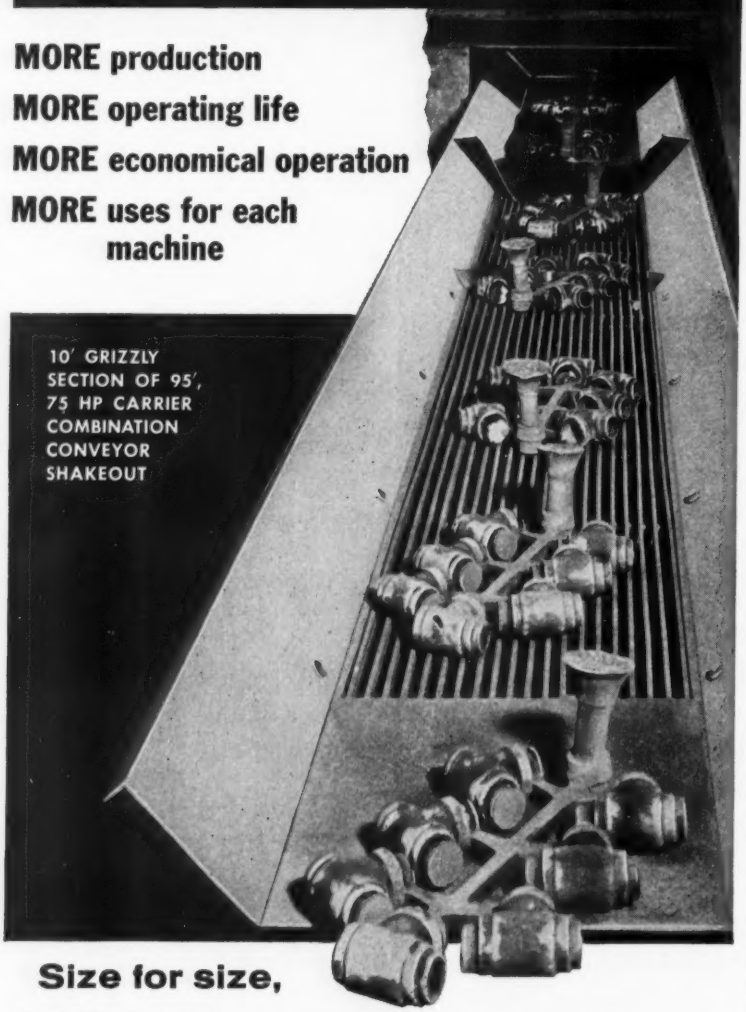
Chicago Division. 520 WEST TWENTY-FIFTH STREET • CHICAGO 16, ILLINOIS • Victory 2-2200

Quad-Cities Division 2500 EIGHTH AVENUE • EAST MOLINE, ILLINOIS • PHONE 35295

Circle 679 on Page 53

You get more for your money with NATURAL-FREQUENCY®

MORE production
MORE operating life
MORE economical operation
MORE uses for each machine



Size for size,
CARRIER NATURAL-FREQUENCY® Conveyors...

have more capacity, last longer, operate more reliably, cost less to maintain than any other vibrating conveyor!

ASK ANY CARRIER USER

SEE US AT THE FOUNDRY SHOW
BOOTH 1025-1124

For full information, write Carrier Conveyor Division, CHAIN Belt Company, 216 North Jackson Street, Louisville 2, Kentucky

CARRIER CONVEYOR
NATURAL-FREQUENCY® VIBRATING EQUIPMENT
CHAIN BELT COMPANY

CONVEY • FEED
DEWATER • SCREEN
COOL • DRY
SCALP • COAT
DISTRIBUTE • ELEVATE

radioactive isotopes for sand moisture control and their possible use for better control of cupola operations. Other topics included stress analysis and radiography in the improvement of casting design, the use of plastic patterns, and the use of sonic and ultrasonic testing.

Mr. Braun also explained how scientific and mathematical methods can be adopted to analyze and solve such problems as ways to determine the lowest cost for adequate cupola charges and to ascertain variables responsible for scrap castings.

Die Casting Exposition and Congress To Be in Detroit

The First National Die Casting Exposition and Congress, sponsored by the Society of Die Casting Engineers, will be held in the Detroit Artillery Armory, Nov. 8-11. The exposition will be the first show in the United States devoted only to the diecasting field.

John L. MacLaren, chairman for the event, states that rapid growth of the industry led the society to sponsor the first exposition this year. Detroit was selected because it is headquarters of the automotive industry—largest consumers of diecastings.

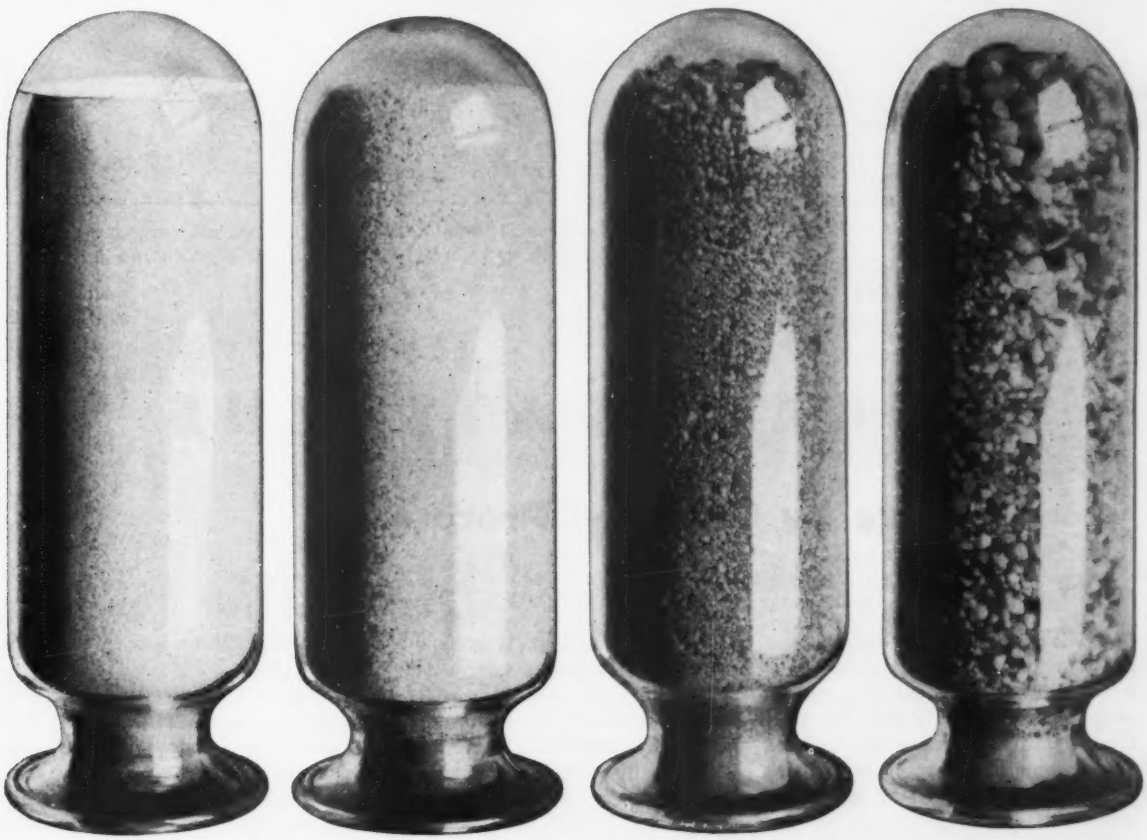
The technical congress to be held in conjunction with the exposition is designed to present the latest developments and trends in the diecasting field.

Equipment Leasing by Metals Industries Grows in 1959

Long-term leasing of production equipment by metal fabricating firms reached a total of $16.3 million worth of equipment on lease, a gain of 26 per cent over 1958, according to Robert Sheridan, president, Nationwide Leasing Co., Chicago. Mr. Sheridan predicted that equipment leasing in the metals industry would double in 1960.

He states that because more equipment manufacturers are using leasing as a sales tool to move their products, more companies will lease their equipment to avoid the pinch of tight money, and more companies will be affected by the increasing technological progress, which is speeding up obsolescence.

Now Pennsylvania Glass Sand offers 35 grades of these foundry sands!



Shell-Molding Core & Molding Semibonded Silica Gravel

Now you can select the sand just right for your casting requirements from our expanded line of foundry sands. Or, we can blend special grades of our new core and molding sands to meet your exact specifications. And, as always, our Supersil silica flour is available in a complete range of grades. So, think of Pennsylvania Glass Sand when you need sand or silica flour for any job.

Pennsylvania Glass Sand Corporation

Industrial Silica Division • Pioneer Silica Products Co.

Sales Offices: 375 Park Ave., New York 22, N.Y. • 2 Gateway Center, Pittsburgh 22, Pa. • 8000 Bonhomme Ave., St. Louis 5, Mo. • 292 Meadows Bldg., Dallas 6, Tex.

Plants: Newport, N. J. • Mapleton, Pa. • McVeytown, Pa. • Utica, Pa. • Berkeley Springs, W. Va. • Dundee, Ohio
Geauga Lake, Ohio • Jackson, Ohio • Phalanx, Ohio • Klondike, Mo. • Pacific, Mo. • Mill Creek, Okla.

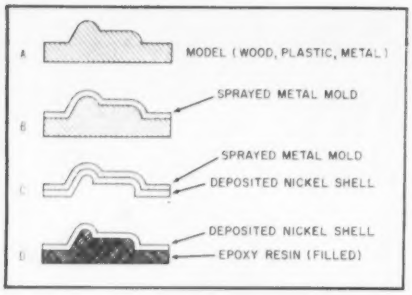


Fig. 1—Steps in making pure nickel shell from original master (die mold or pattern)

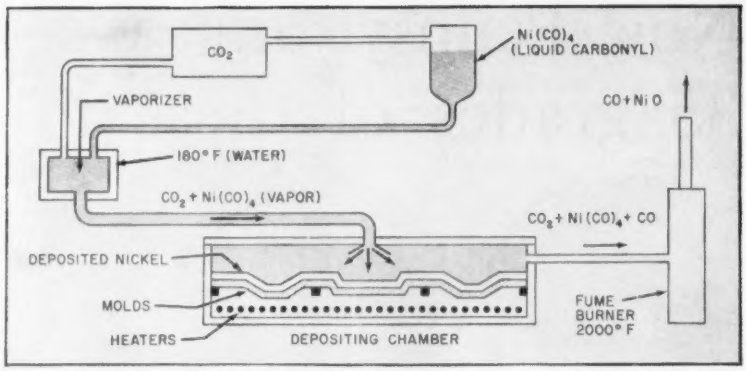


Fig. 2—Flow diagram. Nickel carbonyl liquid flows into vaporizer, then as gas into depositing chamber, where pure nickel shells are formed

NICKEL PATTERNS

Made by Carbonyl Process

● NICKEL PATTERNS, dies, molds, and coreboxes produced by a new carbonyl or gas deposition process have been introduced by Carbonyl Metal Products, Budd Co., Philadelphia. The process is said to provide time savings through the elimination of machining, regardless of the complexity of the part. Thus delivery is sped up.

The nickel patterns are tough: Their Brinell hardness ranges from 181 to 222, and the metal will work harden under impact of sand from slingers, blowers, and rammers. One pattern in an automotive foundry has been used in producing over 100,000 molds without any appreciable wear.

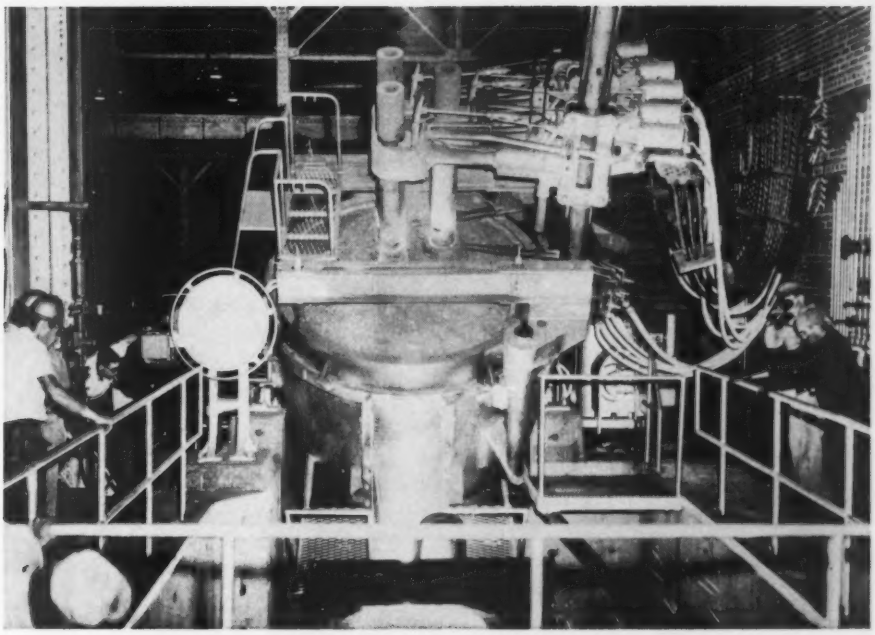
The metal is 100 per cent pure nickel with a melting point of 2600° F. Tensile strength is 85,000 to 95,000 psi, and ductility is high, with elongation 15-20 per cent. The material has extremely high thermal shock properties up to 1600° F, permitting rapid cooling or quenching.

The metal has virtually no porosity and becomes brighter and smoother as the pattern is used, thus providing excellent drawing properties with minimum use of release agents with most types of sand employed by foundries.

Because it is a transferring or molding technique, the process duplicates with extreme accuracy every detail of the original master—whether of wood, plaster, plastic, or metal. Reproducibility tolerances are well within the limits established in the foundry industry — from −0.005 to +0.010 total over-all tolerance, with an average tolerance of ±0.005.

Because of excellent ductility, toughness, and work-hardening capabilities, the carbonyl nickel provides patterns and dies of extremely long life. In severe or heavy-duty service an important factor is ease of

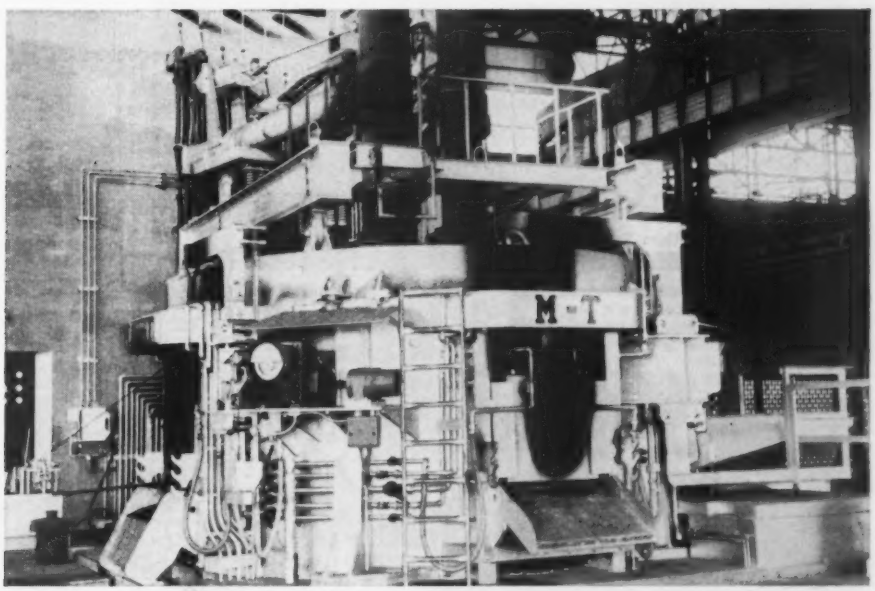
Fig. 3—Pure nickel patterns and molds, as produced by the nickel carbonyl process, for a variety of automotive applications



When you melt or smelt

Lectromelt furnaces are available in types and sizes to suit all requirements—for melting steel for ingots and castings, and gray and malleable iron for castings...melting copper and nickel...producing pig iron, ferroalloys, calcium carbide, phosphorus, etc....and smelting ores. For information, or a consultation regarding furnace requirements, write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

McGRAW EDISON



Lectromelt®

Circle 682 on Page 53

maintenance and repair. The material is welded easily with acetylene or arc-welding techniques. It also is one of the easiest materials to braze or silver-solder; in addition, it takes lead-tin soldering very well.

Nickel patterns and dies can be obtained in a wide range of dimensions, from about 1 x 1 in. up to 60 x 100 in. There is no limit to the degree of complexity of shape or surface configuration—the more highly complicated the piece, the lower the cost as compared with conventional machining and hand-finishing techniques. The nickel shell can be of any desired thickness, depending on the design and the type of application.

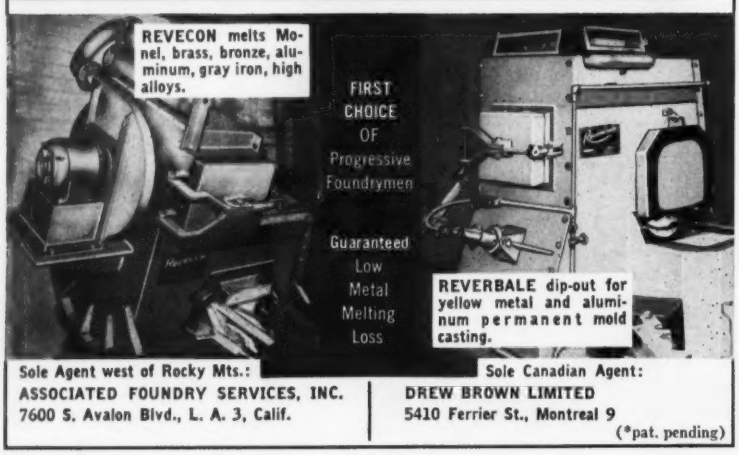
Briefly the process is as follows: A master in wood, plastic, or metal is inspected, treated with a release agent, and sprayed with a special eutectic compound until a mold approximately ½ in. thick has been formed. This negative of the original master then is removed and placed, with its inner or mold surface facing up, in a sealed depositing chamber, together with as many similarly sprayed molds as the chamber will conveniently hold. All of the atmosphere in the chamber is removed and replaced with carbon dioxide.

The molds then are heated inside the chamber to between 325 and 340° F, at which point nickel carbonyl gas, Ni $(CO)_4$, is introduced. Carbon monoxide is released, and the original nickel in the nickel carbonyl gas is deposited molecularly on the heated surface of the molds. Thickness of the nickel deposited is directly proportional to time, which may vary from a few hours to several days depending on the application. Present operation is from 24 to 38 hours. Thickness of the deposit may range from 0.050 to 0.400 in.

The nickel-coated mold is taken from the depositing chamber, and the eutectic material is removed, leaving a shell of pure nickel in the form of a positive reproduction of the original master, accurate in every dimension and detail.

Frequently this nickel positive goes to the customer as a hollow shell, as in D, Fig. 1. Depending on the application, however, it may be filled with epoxy resin mixed iron or aluminum fiber, and a steel backing plate added. This backing plate provides space for lifting bolts or mounting fixtures.

For exact pouring in measured quantities
New REVECON tapping valve*
eliminates turbulence in aluminum and bronzes
because it underpours molten metal
SEE REVECON and Reverbale FURNACES in ACTION
AFS Show, Phila., Pa.—May 9-13, Exhibition Hall BOOTH 1601-5
SEE DEMONSTRATION OF REVECON TAPPING VALVE & HARMARK FLUXES
INTERNATIONAL FOUNDRY SUPPLY COMPANY
545 N. Third St., Reading, Pa.—Sole Agent East of Rocky Mts.


REVECON melts Monel, brass, bronze, aluminum, gray iron, high alloys.
FIRST CHOICE OF Progressive Foundrymen
Guaranteed Low Metal Melting Loss
REVERBALE dip-out for yellow metal and aluminum permanent mold casting.
Sole Agent west of Rocky Mts.:
ASSOCIATED FOUNDRY SERVICES, INC.
7600 S. Avalon Blvd., L. A. 3, Calif.
Sole Canadian Agent:
DREW BROWN LIMITED
5410 Ferrier St., Montreal 9
(*pat. pending)

IBF To Hold Annual Meeting at Malvern, June 21-24

The Institute of British Foundrymen will hold its annual conference at Malvern, England, June 21-24, 1960. The annual general meeting is scheduled for Wednesday morning, June 22, and technical sessions will be held Wednesday afternoon and Friday morning and afternoon, June 24.

Edward Williams Lecture, "Research and Industry," will be given by H. Morrogh, director, British Cast Iron Research Institute. Many visits to area companies have been arranged for Tuesday, June 21, and Thursday, June 23.

Further information can be obtained from the Institute, 14, Pall Mall, London, S. W. 1, England. No reservations can be made after May 20.

Cores bake fast... really hold together with

PENOLYN 178 CORE OIL

Each of the automobile differential carrier cores shown above weighs about 40 pounds. And each core was baked in a vertical conveyor oven at 480°F with a *1-hour cycle*, load to unload. To obtain this fast baking time, the foundrymen used PENOLYN 178. In addition to speed, this clean-working core oil provided them – as it will provide you – with high-baked strength, toughness, and optimum collapsibility.

As a leading producer and nation-wide marketer of core oils for 30 years, Penola is quite proud of its position as a leader in the development of new and more efficient core oils. For further information, contact your nearest Penola office or write: Penola Oil Company, 15 West 51st Street, New York 19, New York.

Penola

YOU'LL BE WELCOME AT OUR CONVENTION BOOTH #623

PENOLA OIL COMPANY NEW YORK · DETROIT · CHICAGO

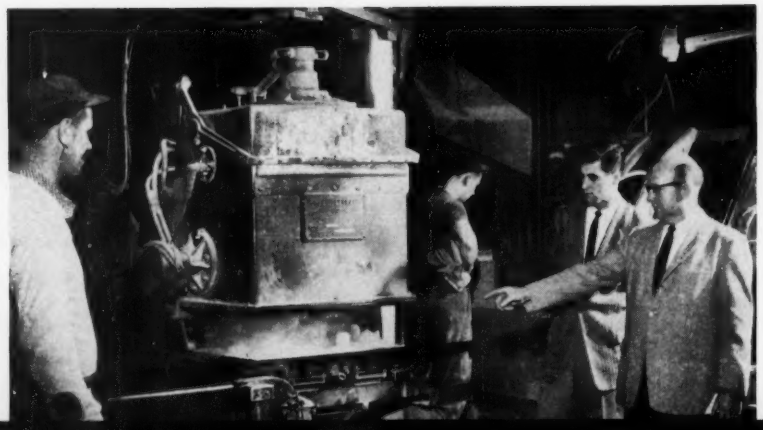
QUALITY · RELIABILITY · FAST DELIVERY · TECHNICAL ASSISTANCE

News Views

NEW MEMBER: H. B. Smith Co., Westfield, Mass., recently was elected to membership in the Gray Iron Research Institute. Left to right are J. L. Brooks, president of the Institute, Lauren E. Seeley, Smith president, who will be representative to the Institute's Board of Trustees, and T. W. Curry, Institute vice president

WINS STOCK: A share of General Electric stock was awarded to E. D. Sandretto, left, Buffalo, and Don Hubbard, center, San Francisco, in a recent industrial x-ray sales contest at GE, based on orders received in their districts by Apparatus Sales Division men. J. D. Webster, Industrial X-Ray sales manager, makes the award

HMA OFFICERS: Herbert W. Gledhill Jr., left, in front, is newly elected president of the Hoist Manufacturers Association. Others shown are Fred E. Rau, right, in front, Hoist sales manager of Yale & Towne Mfg. Co., vice president; and, left to right, in back, Edward J. Byrne, sales manager, Chisholm-Moore Hoist Div., a director; Joe H. Peritz, executive secretary and treasurer; Edward S. Boyer, sales manager, Materials Handling Div., American Engineering Co., alternate director; and Raymond A. Davies, sales manager, Chester Hoist Div., also a director of the institute



FOUNDRY ADDITION: A shell mold foundry has been completed at T. B. Wood's Sons Co., Chambersburg, Pa. The foundry is in a rigid-frame prefabricated, clear-span building insulated with fiberglass. Foundry is located next to the cupola furnaces to reduce heat loss in molten metal transfer and to facilitate pouring of molds

coke...literally hand-picked...
to give you better melting in your cupola

Every foundryman knows how important *uniform coke size* is to a successful melting operation. Size bears a close relationship to carbon absorption, temperature rise, rate of combustion or reactivity, and to pressures.

That's why Semet-Solvay screens its five standard sizes of coke so carefully. And *after* screening, it is actually *hand-picked* to eliminate any oversized or off-quality pieces which might affect results in your cupola.

Yes, there's a size of Semet-Solvay coke just right for your foundry—it's uniform in size and quality for uniform results.

For the whole story, write today for our brand-new booklet, "The Advantages of Using Semet-Solvay Foundry Coke."

Allied Chemical

SEMET-SOLVAY DIVISION

Dept. 572-BH, 40 Rector Street, New York 6, N. Y.

Circle 685 on Page 53

Soffel's MOLDABLE THERMOTOMIC COMPOUND

the best moldable compound — by far!

PITTSBURGH METALS PURIFYING CO., Inc.

Phone: NAtional 5-1571 • Mars, Penna.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Distributors

UNITED STATES

ALA., NORTH BIRMINGHAM
Foundry Service Co.
2321 29th Avenue

CALIF., OAKLAND 8
Pacific Graphite Co.
Fortieth and Linden Street

CALIF., LOS ANGELES
Pacific Graphite Co.
2522 Malt Avenue

CALIF., SANTA ANA
Atlas Foundry Service Co.
P. O. Box 832, 1055 E. First St.

CONN., NEW HAVEN
Frederic B. Stevens, Inc.
168 Brewery Street

ILL., CHICAGO 38
Foundry Specialties Mfg. Co.
6323 So. Central Avenue

ILL., EDWARDSVILLE
Midwest Foundry Supply Co.
270 W. Union Street

IND., INDIANAPOLIS 19
Frederic B. Stevens, Inc.
5345 Lexington Ave.,
P. O. Box 19077

KANSAS, KANSAS CITY 2
Canfield Fdry Supply & Equip.
1721 Minnesota Avenue

MICH., DETROIT 16
Frederic B. Stevens, Inc.
1800 18th Street

MINN., MINNEAPOLIS 14
Smith-Sharpe Company
177-27th Ave., S. E.

NEW YORK, BUFFALO 12
Frederic B. Stevens, Inc.
93 Stone Street

ORE., PORTLAND 1
LaGrand Industrial Supply Co.
15 S. W. Arthur St.

PENNA., CHALFONT
Robert G. Dyer
114 Dolly Lane

TENN., CHATTANOOGA
Fischer Supply Co.
1400 Chestnut Street

TEXAS, HOUSTON
Brandt Equipment & Supply Co.
6620 Dixie Drive,
P. O. Box 14284

UTAH, SALT LAKE CITY 4
Utah Foundry Supply Company
45 So. 3rd West

WASH., SEATTLE
Carl F. Miller and Co.
2450 Sixth Ave. S.

WISC., MILWAUKEE
Milwaukee Chaplet & Supply Corp.
8656 W. National Avenue

CANADA:

ONTARIO, TORONTO 3
Canadian Hanson & Van Winkle Co.
Silver and Morrow Avenues

QUEBEC, MONTREAL
Canadian Foundry Supply & Equip., Ltd.
4295 Richelieu Street

MEXICO:

MEXICO 7, D. F.
Cia Proveedora De Industrias, S. A.
Chihuahua 101

Circle 686 on Page 53

Literature for Foundrymen

For More Information Use Reply Card—Page 53

Ceramic Fiber

Fiberfrax ceramic fiber is discussed in an 8-page brochure which explains properties, available forms, and current uses of the material.—**Carborundum Co.**, Buffalo Avenue, Niagara Falls, N. Y.

For More Details Circle No. 406—Page 53

Casting Machines

Centrifugal horizontal casting machines for producing cylindrical castings are described and illustrated in Bulletin 160.—**Centrifugal Casting Machine Co.**, P. O. Box 947, Tulsa, Okla.

For More Details Circle No. 407—Page 53

Induction Heating Equipment

Eight-page booklet offers illustrations and data on various types of induction heating equipment.—**Ajax Magnethermic Corp.**, P. O. Box 839, Youngstown 1, Ohio.

For More Details Circle No. 408—Page 53

Stationary Air Compressors

Three basic models of the WN-114 stationary air compressor are described in 24-page Bulletin A-72. Specifications and illustrations are included.—**Joy Mfg. Co.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 409—Page 53

Laboratory Equipment

Bulletin 59-12-72 contains descriptions, illustrations, and prices of laboratory apparatus and instruments.—**Burrell Corp.**, 2223 Fifth Ave., Pittsburgh 19, Pa.

For More Details Circle No. 410—Page 53

Mulling Machine

Bulletin 599 explains principles of the Multi-Mull, a continuous, high-capacity mulling machine. Folder contains diagrams and charts of dimensions.—**National Engineering Co.**, 646 Machinery Hall Bldg., Chicago 6, Ill.

For More Details Circle No. 411—Page 53

Industrial Scales

Form 2001e outlines a selection of weighing equipment for industrial use.—**Toledo Scale**, division of Toledo Scale Corp., 2286 Upton, Toledo 12, Ohio.

For More Details Circle No. 412—Page 53

Dust Collection

Pamphlet discusses methods of collecting and measuring aerosols and dusts from ducts and stacks. Equipment for air sampling is presented also.—**Gelman Instrument Co.**, P. O. Box 86, Chelsea, Mich.

For More Details Circle No. 413—Page 53

Shaft-Mounted Speed Reducers

Methods of speed reduction with shaft-mounted units are outlined in Bulletin A692. Construction details, dimensions, prices, and installation information are included in the bulletin.—**Dodge Mfg. Corp.**, Mishawaka, Ind.

For More Details Circle No. 414—Page 53

Handling Equipment

Bulletin 15005-5A-59 covers complete line of jib cranes and crane bridges.—**Manning, Maxwell & Moore, Inc., Shaw-Box Crane & Hoist Div.**, West Broadway Heights, Muskegon, Mich.

For More Details Circle No. 415—Page 53

Digital Indicator

Folder describes Series BH100 Milli-V-Meter digital indicator. Specifications are included.—**B & H Instrument Co.**, 3479 W. Vickery Blvd., Fort Worth 7, Tex.

For More Details Circle No. 416—Page 53

Stainless Steel, High Alloy

Sixty-four page booklet offers information on stainless steel and high-alloy heat and corrosion-resistant castings and their applications. Tables of technical information are included.—**International Nickel Co.**, Readers Service Section, 67 Wall St., New York 5, N. Y.

For More Details Circle No. 417—Page 53

Did You Miss These?

Here is a list of popular literature items offered in recent months:

RADIATION EXPOSURE—St. John X-Ray Laboratory, Califon, N. J. Circle 402, Page 53.

SILICONE RELEASE AGENTS (Bulletin U-5-100)—Dow Corning Corp., Midland, Mich. Circle 403, Page 53.

CASTING ALLOYS—Brass & Bronze Ingot Institute, Chicago, Ill. Circle 404, Page 53.

FERROUS METALLURGY GUIDE—Tempil Corp., New York, N. Y. Circle 405, Page 53.

Wire Rope

Weights, strengths, and advantages of Whyte Strand wire rope are described in Bulletin 6025.—**Macwhyte Wire Rope Co.**, Dept. PR, Kenosha, Wis.

For More Details Circle No. 418—Page 53

Bottom Boards and Core Plates

Bulletin gives information on aluminum bottom boards and core plates. Price list also is offered.—**Jo-el Co.**, 16805 Albers, Cleveland, Ohio.

For More Details Circle No. 419—Page 53

Industrial Truck

Four-page folder illustrates and describes industrial truck F-50T5. Diagrams and photographs are provided.—**Elwell-Parker Electric Co.**, 4205 St. Clair Ave., Cleveland 3, Ohio.

For More Details Circle No. 420—Page 53

Precision Tools

Forty-eight page Bulletin 143 illustrates and describes 88 new tools such as gages, calipers, micrometers, protractors, dividers, and trammels.—**L. S. Starrett Co.**, Athol, Mass.

For More Details Circle No. 421—Page 53

Abrasives

Folder No. 591 describes four types of abrasives and outlines the company's experience and service.—**Alloy Metal Abrasive Co.**, 121 S. Division St., Ann Arbor, Mich.

For More Details Circle No. 422—Page 53

Flux Reclaiming Unit

Bulletin on flux reclaiming unit contains description, illustrations, and technical information, including diagrams. Application of the unit is with submerged arc welding.—**Simplicity Engineering Co.**, Durand 7, Mich.

For More Details Circle No. 423—Page 53

Strain Gage

Bulletin offers information on construction and applications of HTM monofilament strain gages, which are manufactured in four standard configurations. Technical data also are provided.—**High Temperature Instruments Corp.**, Bala-Cynwyd, Pa.

For More Details Circle No. 424—Page 53

Carbon Dioxide

Twenty-four page booklet, Form ADPC-41, on carbon dioxide and its uses, includes discussions of the history, principal applications, properties, manufacture, and supply and distribution of CO_2 as

a gas, a liquid, and a solid.—**Pure Carbonic Co.**, division of Air Reduction Co., 150 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 425—Page 53

Ultrasonic Cleaning

Brochure covers ultrasonic cleaning and rustproofing.—**Rust-Lick Inc.**, Dept. 6, 755 Boylston St., Boston 16, Mass.

For More Details Circle No. 426—Page 53

Products Bulletin

Bulletin P2547P gives features and technical data on company's products, including information on cylinders, piston rods, cushions, boosters, circuits, and pipe thread fittings.—**Flick-Reedy Corp.**, York and Thorndale Roads, Bensenville, Ill.

For More Details Circle No. 427—Page 53

Aluminum Joining

Forty-page manual contains a summary of data on aluminum welding, brazing, and soldering. Charts on composition of aluminum alloys and their technical and physical properties are included.—**All-State Welding Alloys Co.**, P. O. Box 350, White Plains, N. Y.

For More Details Circle No. 428—Page 53

Graphite Products

Engineering Bulletin G12 describes properties and uses of three types of graphite.—**U. S. Graphite Co.**, division of Wickes Corp., Saginaw 14, Mich.

For More Details Circle No. 429—Page 53

Salt Bath Furnace

Salt bath furnaces are described and illustrated in Bulletin 151.—**Lindberg Engineering Co., Salt Bath Furnace Div.**, 2443 W. Hubbard St., Chicago 12, Ill.

For More Details Circle No. 430—Page 53

Plant Machinery

Form 223, "Products for the Plant," covers standard reciprocating, axial-flow and centrifugal air compressors, centrifugal

pumps, steam condensers, steam-jet ejectors, vacuum pumps, air hoists, and air and electric tools. Design features are noted, and size and capacity ranges of the units are given.—**Ingersoll-Rand Co.**, 11 Broadway, New York 4, N. Y.

For More Details Circle No. 431—Page 53

Permanent Magnetic Pulleys

Indox V permanent magnetic pulleys are outlined in Bulletin 1022. Specifications and a selection chart are provided.—**Stearns Magnetic Products**, 635 S. 28th St., Milwaukee 46, Wis.

For More Details Circle No. 432—Page 53

Infrared Heating

Twenty-page bulletin offers information and illustrations on infrared heating, including advantages, principles, applications, and standard systems. — **Fostoria Corp.**, Infrared Div., Dept. 49, Fostoria, Ohio.

For More Details Circle No. 433—Page 53

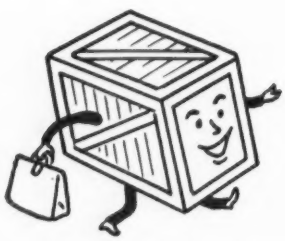
Epoxy Resins

Bulletin describes research and manufacturing operations of the company. Products include epoxy resins, adhesives, insulating compounds, and others.—**Hysol Corp.**, Olean, N. Y.

For More Details Circle No. 434—Page 53

Productive Purchasing

Bulletin GED-3877 provides details of systematic appraisal of product value in business purchasing. Publication describes methods used by the company to improve



IMAGINE OUR SURPRISE!

. . . we shipped

A SALESMAN

to MARION MALLEABLE!

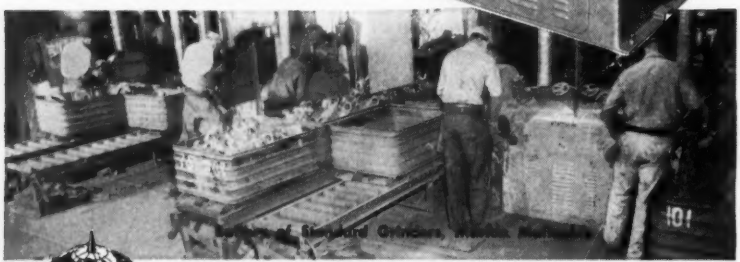
Yes sir, that FIRST Standard 35C Infinitely Variable Speed Grinder we shipped to Marion Malleable in Marion, Indiana SOLD 4 MORE IN LESS THAN A YEAR! When we asked grinding room Super Harold Williams about it, his answer was short—and mighty sweet: "WITH YOUR GRINDERS, WHEEL COST IS DOWN AND PRODUCTION'S UP!"

Here's the way it looks all dolled up in chart form:

Make of Grinder	Wheel Cost Per Ton	Avg. Hourly Production-Tons
Brand X	$3.20	.44
Standard No. 35C	**$1.75**	**.49**

IT'S THE STANDARD STORY WHEREVER YOU GO. Like we said "mighty sweet" ...FOR RAISING YOUR PROFIT CURVE.

BOOTH 230
FOUNDRY SHOW
PHILADELPHIA
MAY 9-13



Ask for literature and you'll see why it pays to Standardize with STANDARD!

the STANDARD electrical tool co.

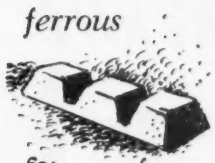
Since 1912

FOUNDRY GRINDER DIVISION

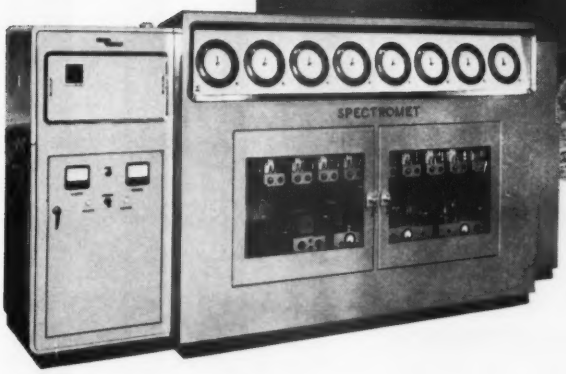
2507 RIVER ROAD • CINCINNATI 4, • OHIO

HALLMARK OF STANDARD THROUGHOUT METALWORKING THE WORLD

ferrous



& non ferrous



SAVINGS

in the melt shop by quick analysis with the

BA SPECTROMET®

CHEMICAL COMPOSITION IN MINUTES
NO LABORATORY REQUIRED

The Baird-Atomic SPECTROMET allows high precision analysis of alloying and minor elements to be made quickly and easily. Results are reported to the melt shop in minutes permitting corrections to be made prior to pouring. The expanded SPECTROMET is specially designed for rugged, practical use . . . to be operated by non-technical personnel.

SAVE MONEY, SAVE TIME, ELIMINATE WASTE

- Eliminate "off analysis" heats.
- Shorter furnace holding time permits more heats per month, minimum loss of alloy elements, longer furnace life, lower fuel costs.
- Conserve expensive alloying elements by confidently aiming at low side of the specification. Detect harmful tramp elements.
- Install close to the melt shop without need for special laboratory.
- Reduce expenses by saving manpower, supplies, and space.

Only the SPECTROMET offers all these features:

- Results presented on indicator dials directly in percent concentration.
- The *Automatic Optical Servo Monitor* to provide continuous compensation for variation in temperature and atmospheric pressure, vibration and shock.
- Parallel interchangeable read-out channels to increase reliability, facilitate maintenance.
- Logarithmic read-out system to permit wide concentration range on one scale, element standardization with one sample, interchangeable channels without calibration.

Visit us at the
FOUNDRY SHOW
Booth No. 1235

Baird Atomic

Baird-Atomic, Inc.

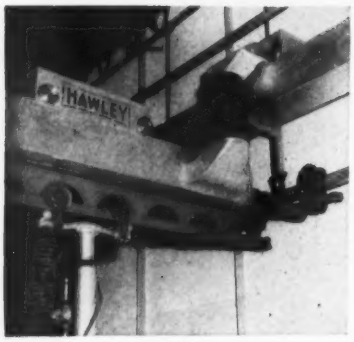
33 UNIVERSITY RD.,
CAMBRIDGE 38, MASS.

Los Angeles/Cleveland/Chicago/Detroit/Dallas/Philadelphia

Circle 688 on Page 53

NEW

HAWLEY
Trav-L-Vent
"Moves with the job"



eliminates big, expensive area ventilating systems

exhausts toxic fumes at any pouring point

• *First and only* real solution to non-ferrous foundry ventilating problems. Eliminates "zinc shakes" and other health hazards . . . improves working conditions. Pays for itself in heat saved. *Installs at less* than ⅓ the cost of inefficient, conventional systems . . . uses as little as 1500 cfm. Will fit *your* foundry layout. Write now for complete information . . . or telephone 1300 in Wabash, Indiana.

HAWLEY MANUFACTURING COMPANY
775 Manchester Ave., Wabash, Indiana
Circle 689 on Page 53

its own purchasing methods more scientifically. A checklist for evaluating equipment suppliers is provided.—**Apparatus Sales Div., General Electric Co.,** Section 666, Schenectady 5, N. Y.

For More Details Circle No. 435—Page 53

Air Compressors

Folder A-1141 discusses Twin-Air rotary screw type air compressors, giving compression principle, design features, operational advantages, and machine dimensions.—**Atlas Copco,** Dept. FO-5, 545 Fifth Ave., New York 17, N. Y.

For More Details Circle No. 436—Page 53

Saw Blade Handbook

Thirty-six page handbook describes selection of saw blades. Sizes and types

of blades are tabulated in Bulletin 578.—**Ladish Co.,** 5481 S. Packard Ave., Cudahy, Wis.

For More Details Circle No. 437—Page 53

Cupola Flux

Superflux, brick-type cupola flux is described in Bulletin SF4.—**Superflux Mfg. Co.,** 16125 Cleophus Parkway, Allen Park 10, Mich.

For More Details Circle No. 438—Page 53

Data Collecting System

Bulletin SP-8665 gives advantages and illustrations of the Collectadata, a data collecting system.—**Friden Inc.,** 1 Leighton Ave., Rochester 2, N. Y.

For More Details Circle No. 439—Page 53

Motor Couplings

Features of Type MC geared flexible motor couplings are described in Leaflets 2875 and 2875A.—**Link-Belt Co.,** Dept. PR, Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 440—Page 53

Beryllium Copper

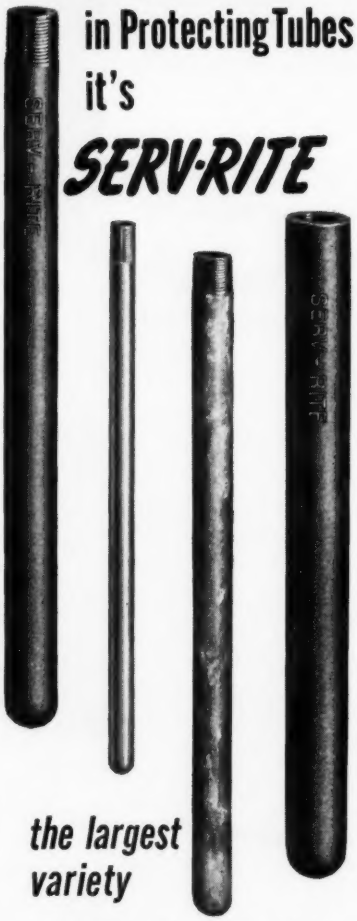
Bulletin explains the properties of beryllium copper for use in investment casting.—**Brush Beryllium Co.,** 4301 Perkins Ave, Cleveland 3, Ohio.

For More Details Circle No. 441—Page 53

Air Tools

Catalog G-60 contains descriptions and illustrations of air tools, including grinders, sanders, and wire brushing tools.

for any requirement in Protecting Tubes it's *SERV-RITE*



the largest variety

In size and length, in iron, nickel, and alloys, and in formed or precision drilled, Gordon has about the largest variety of thermocouple protecting tubes. And you get off-the-shelf delivery on most any of this great variety of "standard" tubes. Gordon also makes protecting tubes to specifications for special requirements.

Give Serv-Rite a trial on your next protecting tube requirements. You can't go wrong. Careful manufacture and rigid inspections assure satisfaction. Get full information today. Ask for Bulletin 11-13.

• **Bulletin 11-13 gives general application data, specifications, and ordering information on Serv-Rite protecting tubes and protecting wells—the largest grouping in one listing.**

6221

CLAUD S. GORDON CO.
Manufacturers · Engineers · Distributors

607 West 30th St., Chicago 16, Ill.
2027 Hamilton Ave., Cleveland 14, O.

Circle 690 on Page 53

Booklet includes charts of specifications and a section on suggestions for getting maximum output from air tools.—**Master Power Corp.**, Box 269, Krick Road, Bedford, Ohio.

For More Details Circle No. 442—Page 53

Belt Conveyor Idlers

Details of construction, diagrams, dimensions, and specifications of belt conveyor idlers are given in Bulletin 171.—**Hewitt-Robins Inc.**, 666 Glenbrook Rd., Stamford, Conn.

For More Details Circle No. 443—Page 53

Diecasting Machine

Description of features and standard specifications of 800-ton diecasting machine are available in a bulletin.—**Lester-Phoenix Inc.**, 2711 Church Ave., Cleveland 13, Ohio.

For More Details Circle No. 444—Page 53

Power Tools

Industrial power tools and accessories are described and illustrated in Form F-

14625. The 64 page bulletin contains specifications and technical data.—**Skil Corp.**, 5033 Elston Ave., Chicago 30, Ill.

For More Details Circle No. 445—Page 53

Melting Furnaces

Line of nonferrous metal melting furnaces is covered in Bulletin 591. Illustrations are provided.—**Hevi-Duty Electric Co.**, division of Basic Products Corp., P. O. Box 563, Milwaukee 1, Wis.

For More Details Circle No. 446—Page 53

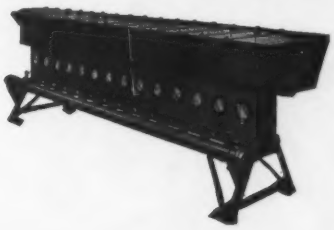
Welders

Volume 11, Issue 1, of *Memco News* includes descriptions and illustrations of new welder models. Twenty-page booklet also gives specifications of the welders.—**Miller Electric Manufacturing Co.**, Appleton, Wis.

For More Details Circle No. 447—Page 53

Hand Traveling Cranes

Four-page folder, Bulletin DH-468-C, contains description and technical data on Type B-9, Wright top-running, single-



For Washing and Reclassifying Foundry Sands

The CONCENCO®CPC Classifier is ideal for sizing and conditioning new or used foundry sands. It sorts the sands into multiple sizes while washing out the dirt and refuse. The sorting action is by hydraulic water only, is continuous and sharp. There are no moving parts. Each cell produces a product of desired mesh. Dirt and refuse are discharged with slime overflow. Sizes are then recombined as you wish for meeting specifications. Send for complete information.

The Original Deister Co. • *Inc.* 1906

The Deister Concentrator Company, Inc.

935 Glasgow Ave. • Fort Wayne, Ind., U. S. A.

Circle 754 on Page 53

Action Exhibits

BOOTH 625

✔See working model of Hartley Sand Level Control at the Castings Congress and Exposition

HARTLEY Controls CORPORATION

Originators of completely automated foundry sand systems

NEENAH • WISCONSIN

chips or briquettes

—it's still world famous

HOEGANAES MELTING STOCK

GRADE "A"
available in briquette form—write for price & data folder No. 119

GRADE "E"
available in briquette or chip form—write for price & data folder No. 120

The very first on the American market. These Ancor Sponge Iron Briquettes or Chips are virgin, soft iron of extreme purity, free from tramp elements and dissolved gases. They're time-tested and field-tested as a raw material for quality steel production, primarily in acid open hearths, induction furnaces and basic electric arc furnaces.

Hoeganaes Ancor Sponge Iron is a metallic product reduced from iron ore at such low temperature that melting of the iron or the gangue constituents has not taken place. *They have exceedingly uniform analysis from shipment to shipment.*

This is of importance too . . . the following elements are non-existent or only present in trace amounts . . . Nickel, Molybdenum, Cobalt, Zinc, Hydrogen, Nitrogen, Chromium and Tin. Ancor Sponge Iron has a very high degree of reduction—96%. It performs at least as well as a low-carbon, high-grade ingot iron.

If you're interested in *regularity of your melting operation* and *greater uniformity of your steel analysis*, be sure to write for the fact-filled literature. Better still, ask for a Hoeganaes Engineering Specialist to call and give all the facts first hand. He's at your service.

HSIC

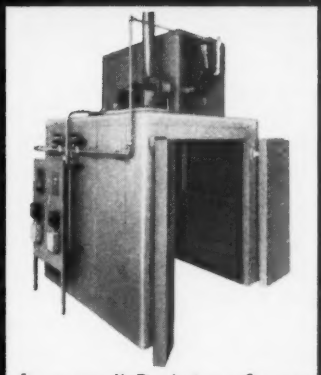
HOEGANAES

HOEGANAES SPONGE IRON CORPORATION

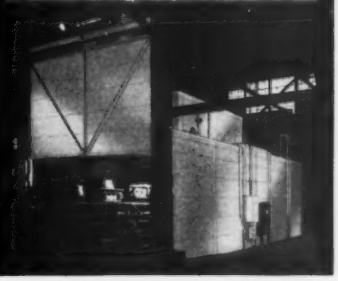
RIVERTON, NEW JERSEY

SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Los Angeles, Minneapolis, New England (Elmira, N.Y.), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

LANLY heat processing equipment for the FOUNDRY INDUSTRY



from small Rack type Ovens to the BIG CAR TYPE OVENS



If a need arises to replace or improve your Foundry Ovens, it is only logical to look to LANLY, recognized authorities in the design and construction of heat processing equipment for more than 22 years.

TODAY may be the opportune time to survey your present facilities and request the counsel of a LANLY representative at no obligation.

THE lanly CO.

FOUNDRY OVENS 2800 Euclid Avenue • Cleveland 15, Ohio

write for FREE bulletin

Find Your Representative in The Yellow Pages

Atlanta, Georgia Birmingham, Ala.
Boston, Mass. Chicago, Ill. Cleveland, Ohio
Columbus, Ohio Detroit, Mich.
Rochester, N. Y. Pittsburgh, Pa.
San Francisco, Calif. St. Louis, Mo.

Circle 692 on Page 53

bridge, hand-traveling cranes. — **Wright Hoist Div., American Chain & Cable Co.**, York, Pa.

For More Details Circle No. 448—Page 53

CO_2 Process

Booklet describes advantages of CO_2 process. It discusses sand, binder, additives, and carbon dioxide used.—**Frederic B. Stevens Inc.**, 1800 18th St., Detroit 16, Mich.

For More Details Circle No. 449—Page 53

Cast Alloy Designations

Folder lists revised standard designations and chemical composition ranges for heat and corrosion resistant cast alloys.—**Alloy Casting Institute**, 1001 Franklin Ave., Garden City, N. Y.

For More Details Circle No. 450—Page 53

Standard Unit Dies

Standard unit dies for zinc and aluminum diecasting are featured in four-page folder. Prices and dimensions also are provided.—**Detroit Mold Engineering Co.**, 6686 E. McNichols Rd., Detroit 12, Mich.

For More Details Circle No. 451—Page 53

Snagging Wheels

Form S103 describes Sterdense resinoid snagging wheels and BL and BN bonded wheels. Specifications are given.—**Sterling Grinding Wheel Co.**, Tiffin, Ohio.

For More Details Circle No. 452—Page 53

Silica Sand

Brochure illustrates the company's silica sand production facility and describes applications of its products.—**Ottawa Silica Co.**, Dept. T, Ottawa, Ill.

For More Details Circle No. 453—Page 53

Thermocouple Components

Specification sheet FS005-3 contains information on QuiK-Konnect thermocouple components. — **Minneapolis - Honeywell Regulator Co.**, Industrial Div., Penn and Bay Streets, Fall River, Mass.

For More Details Circle No. 454—Page 53

More than one road may be open, in the search for better utilization of facilities and realistic cost control. For example, there are improvement of methods, reorganization of plant or department layout, simplification of paper work . . . *to name only a few.* WESTOVER experience can point out the best way for your company to travel . . . and help you over the rough spots.

WESTOVER SERVICES

Plant Layout & Rearrangement • Operation Analysis • Methods Analysis • Supervision Effectiveness • Payroll Analysis • Occupational Evaluation • Job Evaluation • Labor Relations Problems • Formulation of Personnel Policy • Timestudy • Standard Data Standards • Incentive Wage Payment Plans • Cost Controls (Direct Labor, Indirect, Maintenance) • Production Control & Scheduling • Simplification of Clerical Work • Accounting — Cost • Product Cost Estimating • Variance Reports • Technical Problems.

SPECIAL SERVICE ASSOCIATES

This is a special WESTOVER DIVISION, that enables you to put some of the best brains in industry to work in your plant . . . for as long or as short a time as their special know-how and experience are needed to handle specific assignments requiring authoritative background and ability.

WESTOVER has given over a quarter-century of practical service to industry in the U. S. A., Canada and Mexico. This extensive experience, combined with a fresh viewpoint, can help you achieve more effective plant utilization. Write or call today, for information on either WESTOVER SERVICES, or SPECIAL SERVICE ASSOCIATES.

Westover CORPORATION

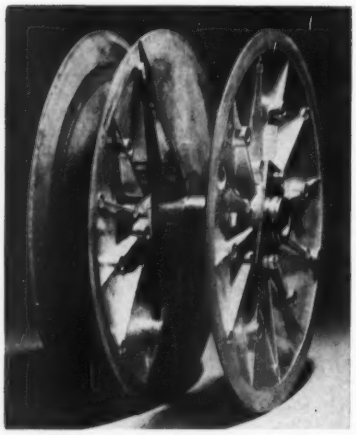
Phone CUster 3-2121

3110 W. FOND DU LAC AVE.

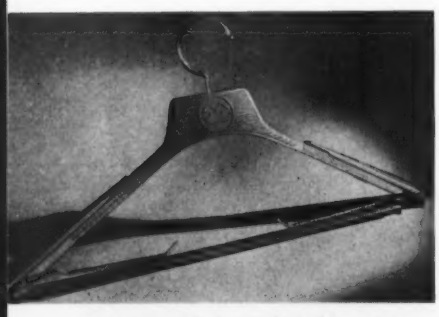
MILWAUKEE 10, WIS.

Circle 693 on Page 53

High-fidelity speaker basket won first prize. Diecast in zinc as a single part, it replaces an assembly made of several stampings



Second-prize winner submitted a conical disc. Cut-away view here shows how the discs are mated to make up a speed changer unit on a combination washer-dryer



Designer of this adjustable coat-suit hanger won third prize. The hanger uses five zinc diecastings

Winners Picked in Zinc

DIECASTING CONTEST

● WINNING ENTRIES in the "Lighter Than You Think" zinc diecasting contest sponsored by New Jersey Zinc Co., New York, include a high fidelity speaker basket, a conical disc used in a combination washer-dryer, and a coat-suit hanger.

The contest offered cash awards for the best examples of lightweight, thin-walled zinc diecastings which combined the advantages of the diecasting process and the qualities of Zamak zinc alloys. Any product, assembly, or component using zinc diecastings of thin-wall construction was eligible provided that it was submitted by the designer of the part. Judges were Colin Carmichael, editor, *Machine Design;* Charles O. Herb, editor, *Machinery;* and Frank J. Oliver, editor, *Electrical Manufacturing.*

To establish a base for evaluating each entry within the objectives of the contest, the judges agreed on the importance of these features: 1. Lightweight, thin-wall construction. 2. Originality and uniqueness of the application. 3. Utilization of the special properties of both material and process. 4. Combining of component functions. 5. Over-all production economy accomplished by the design.

The Winner — First prize was taken by Bernard C. Sharp, University Loudspeakers Inc., White Plains, N. Y., with a high fidelity speaker basket. Formerly made of several stampings, the basket is diecast as a single part which measures 13 in. from corner to corner and contains the supports, flanges, slots, ribs, holes, studs, and channels for three different models of speakers.

The diecasting possesses all the rigidity and dimensional stability necessary to assure permanent centering of the speaker cone, magnetic pot assembly, and other components, yet weighs only 2 lb 12 oz. Nominal wall thickness is 0.040 to 0.050 in. Significant cost savings were realized in assembly and in the elimination of expensive spinning and finishing operations.

Second Place — Winner of the second prize was Creighton E. Pool, Home Laundry Engineering, General Electric Co., Louisville, Ky. His entry was for a conical disc designed so that parts are interchangeable and interlocking. Four of the discs make up the major portion of the speed-changing device used on the GE combination washer-dryer. The 7½-in.-diam, multiple-use disc replaces steel stampings and machine hubs used previously. It provides greatly simplified assembly, lower tooling costs, a minimum of machining, and more efficient operation.

Third Prize—J. W. Anderson Jr., Monarch Governor Co., Willow Run, Mich., took the third award for an adjust-to-size clothes hanger made of three thin-walled zinc diecastings and two zinc diecast thumb screws, plus a spring clip, hook, and nameplate. Size markings are cast onto the face of the main frame for accurate adjustment to either men's or women's coats. An original design, the product is assembled at very low cost and is finished with one of several baked enamel colors.

Citation Awards—The judges also selected six other entries which deserved special consideration because of their exceptional merits. A Citation Award was made to each of the following: Ed Shortess and Paul Radecky, Hickok Electrical Instrument Co., Cleveland, for a meter movement frame; Henry W. Smith, Curtis-Allbrite Lighting Inc., South San Francisco, Calif., for a light fixture bracket; John H. Weimer, Hubley Mfg. Co., Lancaster, Pa., for scale model car components; J. A. Bailey, Barber-Colman Co., Rockford, Ill., for a thermostat cover frame; Walter R. Kirchhoff, Roanwell Corp., New York, for an adjustable cord holder; and F. Pelehack, Royal McBee Corp., Hartford, Conn., for typewriter end covers.

YES...small foundries can afford mechanization

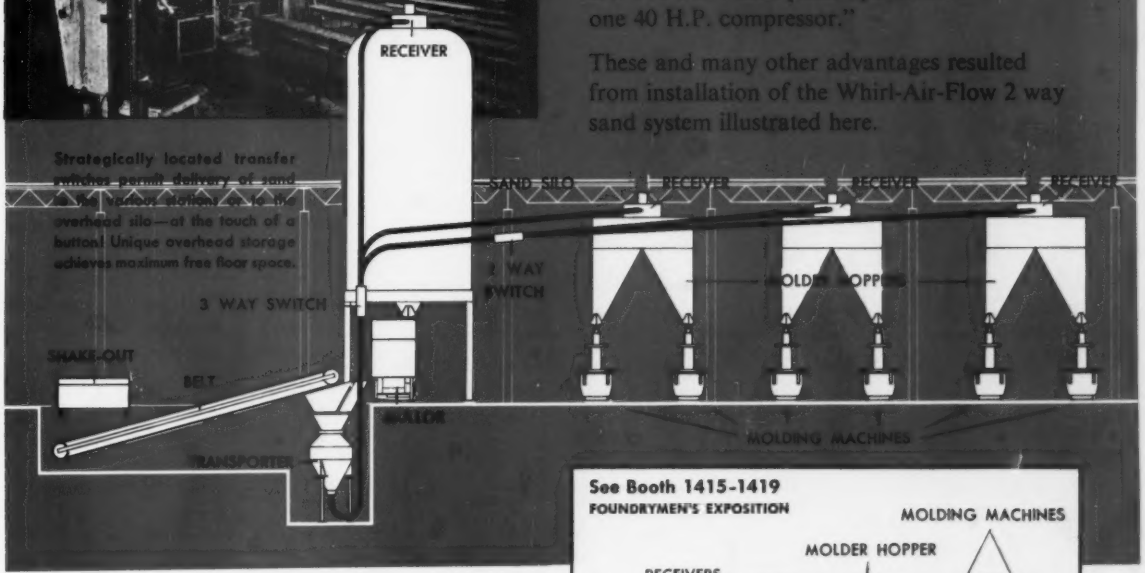
states Frank Ryan, President, St. Paul Brass Foundry, St. Paul, Minnesota

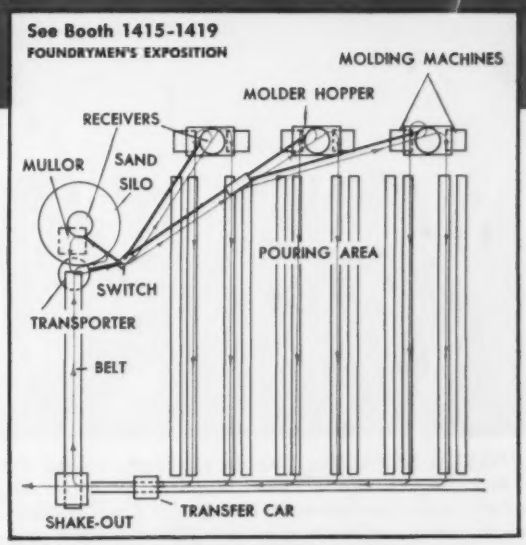
"Here is a summary of our savings over our previous operation.

40% Saving in sand handling labor
15% Saving in molding labor
15% Less scrap.

And we find air consumption extremely low . . . our whole plant operates on one 40 H.P. compressor."

These and many other advantages resulted from installation of the Whirl-Air-Flow 2 way sand system illustrated here.





BETTER SAND PROPERTIES...

. . . result from Whirl-Air-Flow delivery. The performance results are shown below:

	BEFORE TRANSPORTING	AFTER TRANSPORTING
Moisture	3.0%	3.0%
Green Compression	15 P.S.I.	16 P.S.I.
Permeability	21	23

TELL US YOUR HANDLING PROBLEM—Let us show you how Whirl-Air-Flow can boost your production and reduce costs in your plant.

WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

6330 25th Ave. S. E. Minneapolis 14, Minn.

Around the Country

NEWS REPORTS FROM

Boston . . . Philadelphia . . . Chicago . . . Detroit

Detroit— Chrysler Corp. currently is producing 10,000 six-cylinder engines with diecast aluminum blocks said to be cast at the company's Kokomo, Ind., diecasting plant. The engines are being installed in taxi cabs and corporate autos throughout the country. All are controlled by Chrysler which is conducting an extensive field testing program.

Centrifugally cast gray iron dry liners are incorporated in the blocks. Various groups of engines are being equipped with sand cast aluminum, sand cast gray iron, or permanent molded aluminum heads for the test program. A diecast aluminum head still is in the design stage. According to a Chrysler engineer familiar with the project, a diecast head would have a shape different from conventional heads. It possibly could consist of two pieces which would require two gaskets when it is mounted on the block.

The aluminum engines being tested are in the same horsepower range as the cast iron engines currently used in Valiant, Plymouth, and Dodge Dart passenger cars.

It seems obvious that the extensive field test underway leaves little doubt that Chrysler Corp. will be using diecast aluminum blocks in engines for some of its 1961 models. In all probability, Chrysler's Kokomo plant by now has at least four 2000-ton capacity diecasting machines capable of delivering a shot of about 75 lb of aluminum. FOUNDRY reported in November that three such machines were ordered, as the result of satisfactory production experience with a fourth machine of the same capacity installed early in 1959.

Philadelphia— Foundries generally are having to scratch for business. Except perhaps in malleable, backlogs are light and consumer interest sluggish. Some operating schedules may be a little more extended than a month ago, but no marked improvement is discernible.

Gray iron job shops are operating four or five days a week, and average two to three weeks on backlogs. Papermaking and textile machinery requirements are fairly active, also power transmission and material handling equipment. But in general, and particularly in heavy work, there is still a considerable lag. Some specialty shops report spotty operations. This is true even of soil pipe manufacturers, despite the more favorable seasonal influences.

Lag in heavy industrial equipment and utility work and the drop in ship work are reflected in steel casting schedules. Prolonged strike at the eight eastern shipyards of Bethlehem Steel Co. not only has been felt by their captive foundries, but also by job shops since normally some outside purchases have to be made.

Steel job shop operations are between four and five days a week, with most shops able to take on work for delivery within four to five weeks.

Malleable demand is well sustained, especially by orders for pipe fittings, hardware, and truck components. Shops generally are running at a full five days a week, and have backlogs extending five to six weeks.

Light metal foundries are operating about five days a week, but brass and bronze shops average little more than four days and are having difficulty sustaining that rate.

Raw materials are in ample supply in all lines. This is especially notable in pig iron, where domestic supply is augmented by imports from West Germany, Holland, and South Africa and, to some extent, from Spain.

SYMPOSIUM SPEAKERS: Charles W. Briggs, second from right, technical and research director, Steel Founders' Society of America, and J. F. Wallace, right, professor of metallurgy, Case Institute of Technology, were the main speakers at a metallurgical symposium held on March 10 at the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va. They are shown with Col. H. J. Skidmore, director of the Laboratories, and William H. Baer, left, a civilian employee, Materials Branch of the Laboratories, who was program chairman of the symposium

Chicago— Delivery of molten aluminum from Alcoa's new Warrick works near Evansville, Ind., to

Circle 696 on Page 53→

"...and safe at 150% of specified maximum speed..."

Every Peninsular wheel must pass this test—must prove before delivery to you that it can safely take half again as high a speed as the maximum safe speed recommended.

It is one of a series of grueling tests developed by Peninsular to make sure that its wheels—vitrified or resinoid—are the safest and highest performance wheels you can find anywhere.

Our 1960-1961 catalog is now off the press. Ask for your copy today.

PENINSULAR

GRINDING WHEELS

District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL COMPANY • 729 MELDRUM AVENUE • DETROIT 7, MICHIGAN

STEEL SHOT

AND GRIT

$165.00

per ton

truck-load-lots

- "SUPER-STEEL" is high quality steel shot and grit, made at lower cost by a *revolutionary new process.*
- "SUPER-STEEL" *savings* are passed along to foundries.
- "SUPER-STEEL" is *guaranteed* to match the performance of any steel shot and grit now on the market.
- Write, wire or phone (collect) for full information.
- Inquire, too, about our free engineering service, lab tests and our low prices on "SEMI-STEEL", malleable and chilled abrasives.

METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO • Phone: EXpress 1-4274

ALSO IN: Chattanooga • Chicago • Cincinnati • Dayton • Detroit • Elberton, Ga. • Grand Rapids • Greensboro, N. C. Houston • Los Angeles • Louisville • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh and St. Louis.

the Fabricast plant of General Motors Corp.'s Central Foundry Div. at Bedford, Ind. is expected to begin in June.

The 105-mile trips over hilly roads of southern Indiana are regarded as a major innovation in the trucking industry. Special insulated trucks for the haul reportedly are being designed and built at the Bedford foundry. Each of the trucks is expected to carry from 3 to 6 tons of 1650° F liquid aluminum. It is understood the metal will remain hot long enough to be poured into molds without reheating upon arrival at the Fabricast foundry.

Molten aluminum has been transported by trucks before but never in such large amounts over such a long distance. For many years it has been common practice to transport molten iron from blast furnaces to steelmaking furnaces in insulated ladle cars, but such hauling is over rails and usually on private right-of-way.

* * *

Cook county board of commissioners has enacted into law the long-debated comprehensive amendment to the Cook county zoning ordnance. The new code includes provisions regulating noise, vibration, odors, particulate matter, and storage of flammables.

Observers have pointed out that foundries would find it virtually impossible to conform to the standards on smoke and particulate matter. The Illinois Manufacturers' Association did succeed in getting some modification of the original, unworkable proposals. As adopted, however, the code still contains unscientific standards which confront industry with many imponderables.

The association is appointing a small committee—specialists in the fields mentioned—whose function will be to assist the zoning administrator in any possible way in his administration of the law.

Boston— Gray and malleable iron foundries are operating with small backlogs, and so far this year have experienced only spotty improvement in new orders. Users of castings are not anticipating requirements, and inventories generally are low. New orders placed with jobbing shops are for prompt shipment.

Machine tool volume is improved only slightly, although a strike at one Connecticut plant buying castings ended early in April. There has been some diversification by New England machine tool builders, notably plastics machinery, and to a considerable extent this situation contributes to some demand for castings.

Textile mill equipment shops are active, but few are farming out foundry work. Saco-Lowell Shops, Boston, has booked a large worsted spinning machinery order for Jeremiah Ambler Ltd., Northern Ireland, but this equipment will be built at southern plants.

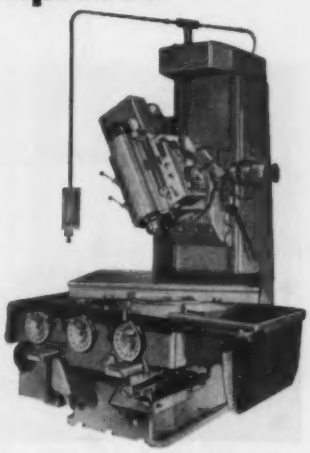
Foundries producing for highway and building requirements are seasonally active; included is the LeBaron foundry, Brockton, Mass., which is installing new sand preparation and handling equipment.

Malleable shops for several weeks shipped more tonnage than they booked, thereby reducing backlogs and leadtime. Wollaston foundry,

Avoid Double Handling of Large, Heavy Workpieces

with a BOKOE F3

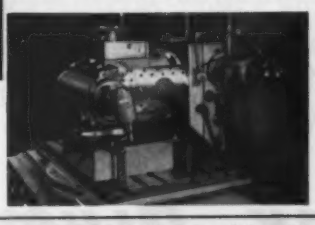
Universal Miller



Save costly set-up time and avoid transferring bulky workpieces from one machine to another —with the BOKOE F3 Universal Milling and Boring Machine. On one, versatile machine you can now perform boring, milling and drilling—often on 5 sides—without re-setting the workpiece. The remarkably flexible operation of the BOKOE F3 is especially suited for the machining of ferrous and non-ferrous castings, dies, molds, and metal and wooden patterns. Check these many BOKOE features for *your* production needs . . .

Rotary milling on large component.

- Coordinate positioning of rotary worktable with steplessly adjustable feeds for transverse, longitudinal and rotary movements—operating either individually or simultaneously. Rapid travel for all three directions.
- Clamping area up to 63" x 31.5". Longitudinal movement up to 72", transverse movement up to 28". Maximum workpiece diameter for circular and radius milling, up to 98". Maximum distance, main spindle to column, 48".
- Stepless spindle speeds from 36—1800 rpm. Six spindle feeds from .0016 to .016 in./revolution. Spindle slide rotates 90° in either direction. Entire column rotates 360°.
- All electrical equipment in accordance with J.I.C. standards.

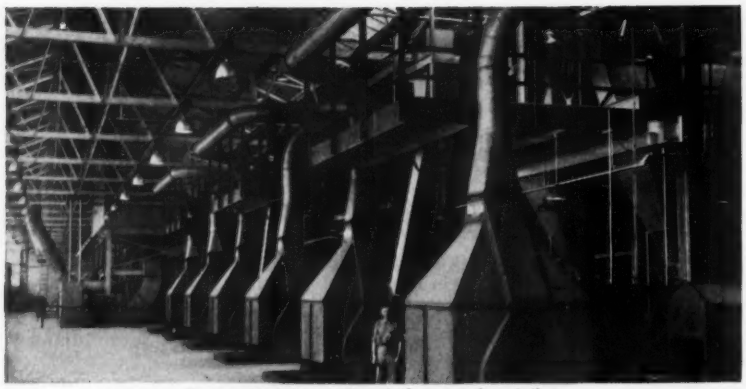


Head turned 90° with right-angle milling attachment.

Write for Information

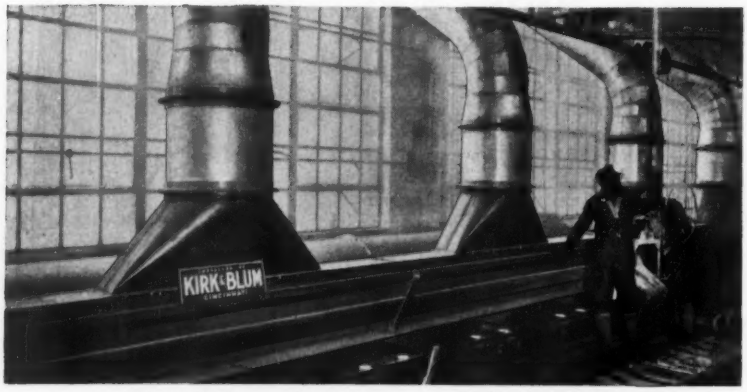
COSA *Importers of Leading Precision Machine Tools Nationwide Sales and Service*
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IN CANADA contact COSA CORP. OF CANADA, LTD., 1160 Lakeshore Rd., Long Branch, Toronto 14, Ont.



Fume control for moving platform pouring station.

No two fume control problems are alike!



Moving platform pouring station, lower production requirements.

Since no two fume control problems are alike, a Kirk and Blum engineering survey determines the exact nature of *your* specific application. It's all part of K & B's *complete* service to assure you the best system for your particular need, all factors considered.

From survey time until the system is completed and in operation, Kirk & Blum handles the entire job with one undivided responsibility . . . a condition only possible when you have *one* source for all service, *one* guarantee for all components.

Write today for the new 52-page K & B Catalog or a no-obligation survey of your particular problem. The Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati, 9, Ohio.

KIRK & BLUM

Complete Fume and Dust Control Systems

North Quincy, and Hunt-Spiller, South Boston, have recalled some men. In one or two instances new crews have been added to avoid overtime costs by employment of one shift, but this is contrary to the general trend.

Except to fill special orders, nonferrous operations hold close to 75-80 per cent of capacity. Valve and meter needs are sustained, also fine aluminum work for the electronics industry. Steel foundries lag behind both iron and nonferrous shops, due to a lag in heavy equipment.

For small arms weapon components, use of investment castings instead of machined parts is growing. Including the Springfield, Mass., armory, three shops in New England have substantial small arms contracts. At Springfield, use of investment castings for some rifle parts eliminates machining operations and saves expensive tooling; in several cases a single casting is designed to replace several components required by conventional machining. Amount of alloy can be reduced in some cases and improved service life of flash suppressors is attained.

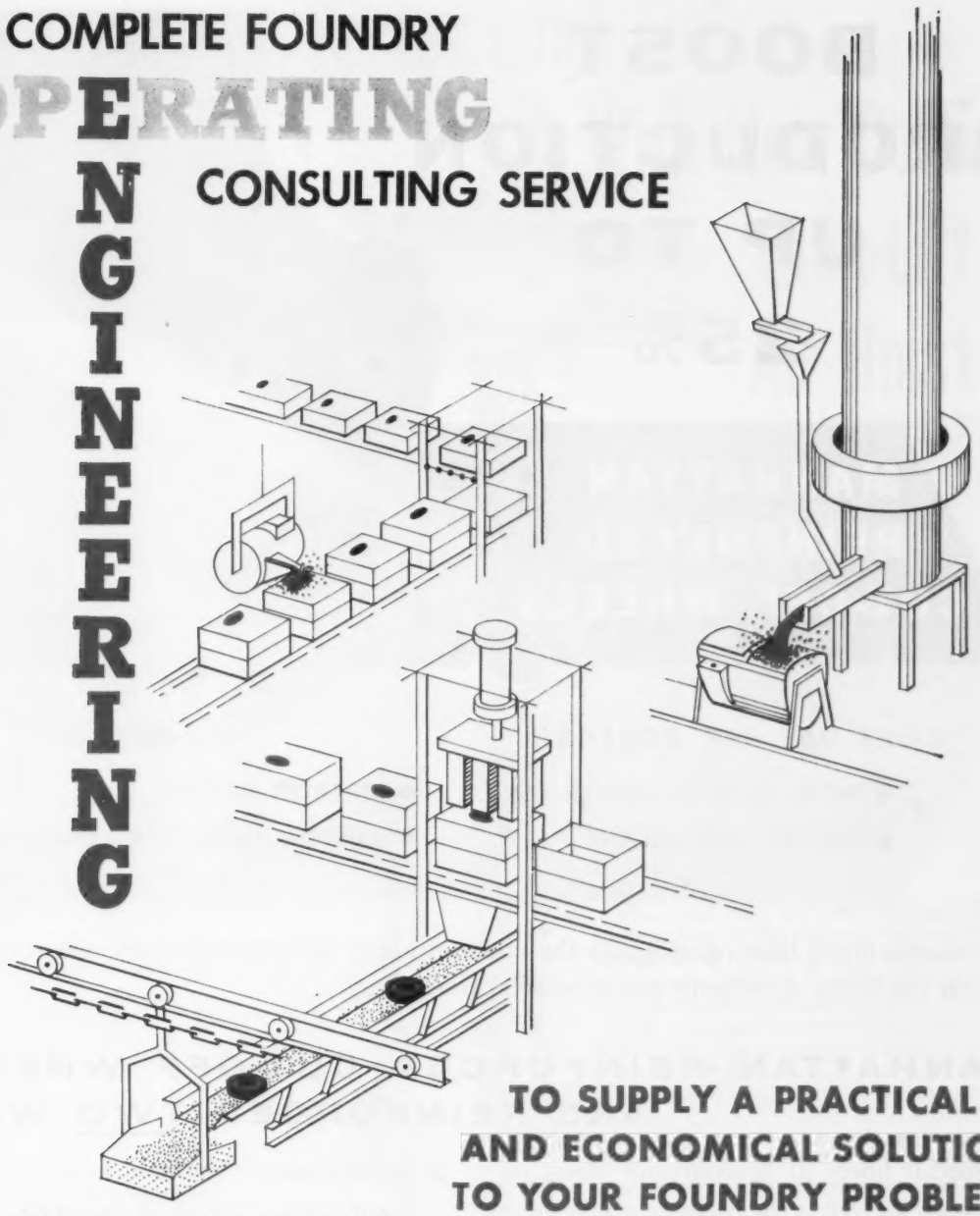
Through second quarter Mystic Iron Works will sell pig iron from stockpile at unchanged prices, $68 per gross ton, No. 2 foundry, f.o.b., Everett, Mass. Mystic furnace closed October, 1959, and substantial stocks have moved slowly, although more gaps in some analyses are now appearing. Foundrymen are confronted with higher pig iron costs before long, but the impact may be eased partially by the establishment of lower freight rates from Beacon, N. Y., and imported iron.

Detroit Chapter Makes Awards In Patternmaking Contest

Top awards in the 1960 Patternmakers' Apprentice Contest of the Detroit Chapter, AFS, went to Adam Kravetz and James Arnold, both of Progress Pattern Co. They finished first in the wood and metal divisions, respectively.

Second and third place winners were Alan Larson, K & W Pattern, and Gordon Gotberg, Automotive Pattern, in wood patternmaking and David Brine, Peerless Pattern, and John Burmeister, Washtenaw

A COMPLETE FOUNDRY OPERATING ENGINEERING CONSULTING SERVICE



TO SUPPLY A PRACTICAL AND ECONOMICAL SOLUTION TO YOUR FOUNDRY PROBLEMS

Foundry Design Co. and associates make available to you a group of experienced foundry operating and engineering personnel presently working in 239 foundries throughout the United States and abroad.

Call or write without obligation for an audit of your present operations and facilities and to learn how we can assist you in your future planning.

- QUALITY CONTROL
- IMPROVED METHODS
- MODERNIZATION PROGRAMS
- EQUIPMENT LAYOUTS
- MANHOUR CONTROL
- MATERIAL HANDLING
- COST REDUCTION SURVEYS
- TIME & MOTION STUDIES
- WAGE INCENTIVES
- PROPER UTILIZATION OF EQUIPMENT

THE HALL-MARK OF DESIGN ENGINEERING ECONOMY FOUNDRY-DESIGN CO.

FOUNDRY DESIGN CO.

AFFILIATES { SORBO-MAT PROCESS ENGINEERS / MEEHANITE METAL CORP.

106 S. Hanley Road., St. Louis, Mo.
Parkview 6-5277

131 Jersey Ave., New Brunswick, N. J.
Charter 6-2125

BOOST PRODUCTION UP TO 25%

MANHATTAN REINFORCED CUT-OFF WHEELS

"MORE USE PER DOLLAR"

- MORE CUTS AT LOWER COST
- FASTER PRODUCTION
- GREATER SAFETY
- CUSTOM-MADE FOR YOUR JOB

Job records prove these wheels take the abuse of heavy cutting in foundry operations—far beyond the limits of ordinary cut-off wheels! Here's why:

MANHATTAN REINFORCED CUT-OFF WHEELS ARE REINFORCED TWO WAYS

1. Special fibers in Manhattan's Bond increase by 50% the wheel's strength to withstand destruction by centrifugal force.
2. Super-strength synthetic lateral reinforcement gives a degree of resistance to side-strain not possible with ordinary wheels.

DOUBLE REINFORCEMENT ADDS UP TO DOUBLE SAFETY—AND PROTECTION FROM BREAKAGE, TOO!

Let a Manhattan sales engineer show you how to get "More Use per Dollar" with Manhattan Reinforced Cut-Off Wheels and other types of Manhattan high speed, heavy duty wheels.

RM-1064

ENGINEERED RUBBER PRODUCTS ... MORE USE PER DOLLAR

RM

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION • PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Circle 701 on Page 53

Winner James Arnold and William G. Shaw, head of Progress Pattern Co.

Pattern, in metal patternmaking.

Judges for the contest were Richard Broniman, Majeske School; Fred Londel, Automotive Pattern; Ralph Schowalter, Dodge Foundry;

Gordon Gotberg with Fred Londel, co-owner of Automotive Pattern Co.

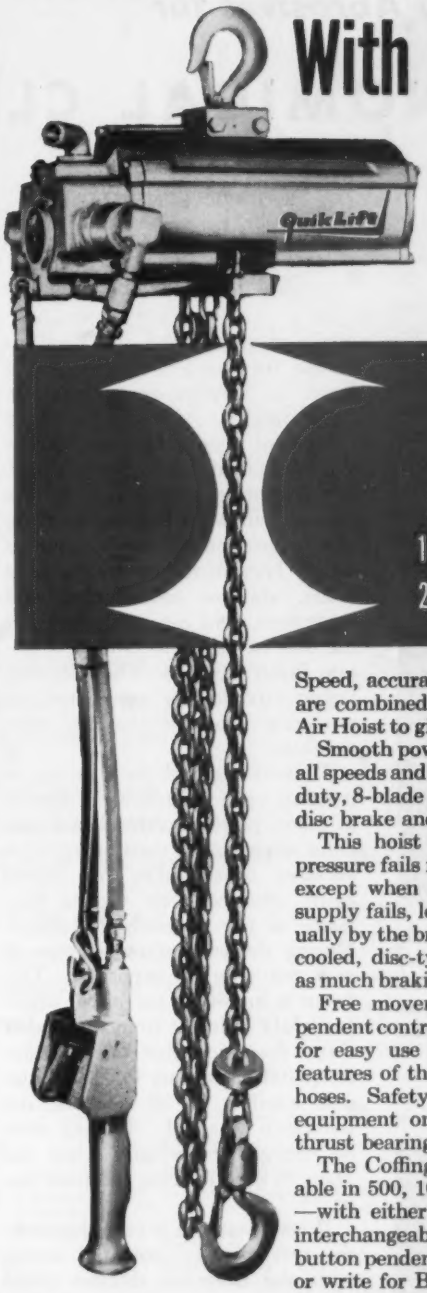
Ray Duquette, Washtenaw Pattern; Charles Haug, Peerless Pattern, and Robert Spengler, Annex Pattern. M. D. Markarian was contest chairman.

Operation of Air-Operated Drop Stamp Shown in Film

A motion picture film from Chambersburg Engineering Co., Chambersburg, Pa., shows the application of restrike operations in a malleable foundry. Operation is performed by the Cecostamp, an air-operated drop stamp which corrects distortion or warp caused by annealing. This feature permits each casting to be inspected and sized in one operation. Restrike also coins to close tolerances, often eliminating subsequent machining operations.

The film is available for exhibition to interested foundries.

Faster Load Lifting With New Coffing Quik-Lift Air Hoist



12 MODELS
lift full load 10 feet
500-pound hoist— 7 seconds
1000-pound hoist— 9 seconds
2000-pound hoist—24 seconds

Speed, accurate control, safety and long life are combined in the new Coffing Quik-Lift Air Hoist to give you efficient hoisting power.

Smooth power flow and absolute control at all speeds and loads is provided by the heavy-duty, 8-blade rotary air motor, the air-cooled disc brake and sensitive controls.

This hoist will not drop its load if air pressure fails for the brake is always engaged except when the motor is activated. If air supply fails, load can be safely lowered manually by the brake adjustment screw. The air-cooled, disc-type brake provides four times as much braking area as conventional brakes.

Free movement so that the push-button pendent control is always correctly positioned for easy use is provided by the swiveling features of the air supply hose and pendent hoses. Safety hooks, which are standard equipment on all models, swivel on roller thrust bearings.

The Coffing Quik-Lift Air Hoist is available in 500, 1000 and 2000-pound capacities —with either link or roller chain and with interchangeable manual pull-cord or push-button pendent controls. Ask your distributor or write for Bulletin ADH-79.

COFFING HOISTS

DUFF-NORTON COMPANY

825 Walter Street • Danville, Illinois

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

Circle 702 on Page 53

Selecting Abrasives for

ECONOMICAL CLEANING

By DAVID E. NEUSTADT
Vice President
National Metal Abrasives Co.
Cleveland

● ABRASIVE COST in blast cleaning operations represents 30 to 75 per cent of total cleaning or peening cost, depending on the finish required. Keeping this cost at a minimum consistent with good foundry practice and cleaning machine time and wear can mean the difference between profit or loss on metal parts production.

A survey conducted within the foundry industry shows that four factors should be considered in the choice of an abrasive: 1. Time involved for the job. 2. Equipment wear. 3. Abrasive consumption. 4. Finish needed.

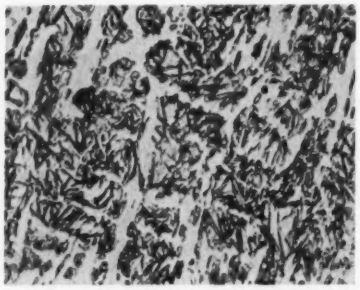
None of these factors can be considered individually. For example, cleaning time always can be decreased, but what happens to abrasive consumption and equipment wear? They skyrocket. By the same token, abrasive consumption and equipment wear can be slashed, but the time necessary to produce a certain finish increases. The following factors should be considered in analyzing the cost-efficiency relationship.

Time—Length of the cleaning or peening cycle is reflected directly in labor, power, overhead and machine amortization costs, along with abrasive consumption per wheel hour. Another part of the time factor is not as easily calculated. During slower business seasons, it may not even be important. This factor is man-time per piece, which is slightly different from total labor cost. Assuming that one abrasive setup finishes a part in 12 minutes and another in 10 minutes, the difference is small. It may even be negligible, especially when the plant is not running at peak capacity.

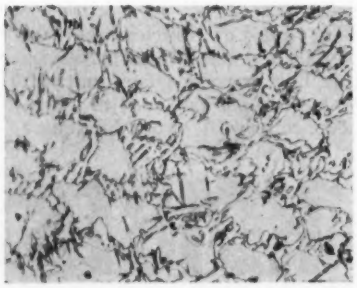
When every job is rush, however, the two minutes' potential saving with the different abrasive could mean an increase in production worth far more than the worker's per-minute labor rate. Furthermore, if the new abrasive did not increase equipment wear, the theoretical savings would be even greater.

Maintenance Cost—Total parts and labor cost in blast-cleaning machine maintenance can represent a large portion of abrasive cleaning cost. To determine what amount of maintenance cost is enough and what is too much, all other details must be examined. Fortunately, guideposts exist.

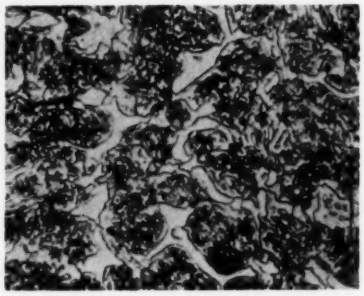
Generally, ordinary chilled iron abrasives, which have great cleaning ability because of high hardness, give users higher maintenance costs compared with several types of softer annealed iron or steel abrasives. From the maintenance angle alone, the annealed iron or steel abrasives are superior to



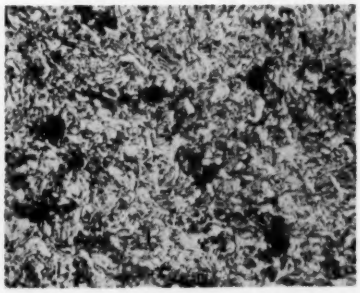
Ordinary chilled iron abrasive, Rockwell C hardness 55 to 68. Heavy carbide deposits (white) with martensite (gray) give excessive breakdown rates. Total carbon, 3%; silicon, 1.53%; and phosphorus, 0.299%



High carbide, ductile matrix. Rockwell C hardness is 50-60. The cross section carries large amounts of carbide with equally massive amounts of austenite. It cleans well and also is durable. Total carbon, 2.64%; silicon, 1.15%; and phosphorus, 0.036%



Uniform sample of pearlitic abrasive. Rockwell C hardness, 46-54. Massive white carbide is for fast, efficient cleaning, and pearlite (black areas) is for long life. Total carbon is 2.64%; graphitic carbon, 0.03%; silicon, 1.20%; and phosphorus, 0.037%

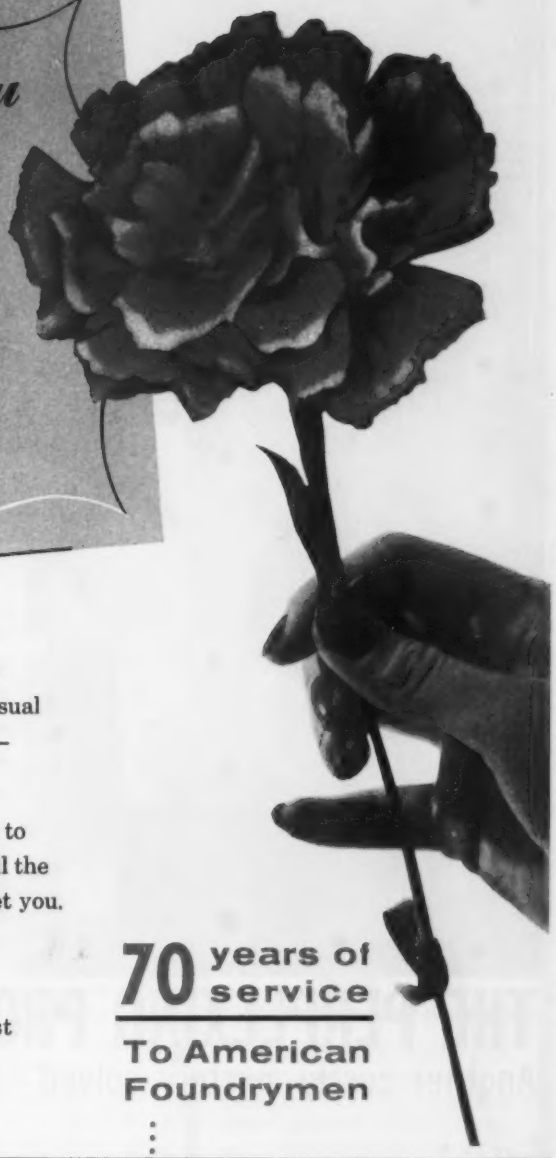


Low hardness pearlitic. Rockwell C hardness is 38-46. Pearlite (gray), carbide (white), and temper carbon (black) are combined for fast cleaning and durability. Total carbon is 2.58%; graphitic carbon, 0.58%; silicon, 1.03%; and phosphorus, 0.027%

We'll be seeing you at the

AFS CASTINGS CONGRESS

May 9-13, 1960



When you visit the Foundry Show you are most cordially invited to visit us—Booth No. 524. As usual there will be a beautiful carnation awaiting you—a Hickman-Williams tradition for many years.

We look forward to meeting our old friends and to making many new ones. Representatives from all the Hickman-Williams offices will be on hand to greet you.

The "Buyers Guide"—yours for the asking—gives complete details on all the many products which we regularly supply to foundries. A request will bring a copy by return mail.

70 years of service

To American Foundrymen

SAND
New Jersey Silica
Albany Molding

CLAY
Dixie Bond • Revivo Bond
Black Hills Bentonite
Lawco Fireclay

COKE
Indianapolis Foundry

PIG IRON
Woodward, Algoma — Basic, Foundry, Malleable, Bessemer
Jisco Silvery

ABRASIVES
Controlled "T"
Permabrasive
Perma Shot • Perma Grit
Perma Steel

FLUXES
Minerva Fluospar
Dolomite • Superflux

ALLOYS
Spiegeleisen
Ferrophosphorus

MISC.
Sajco Jackets
Cupola Bed Lighter
Cupolinor

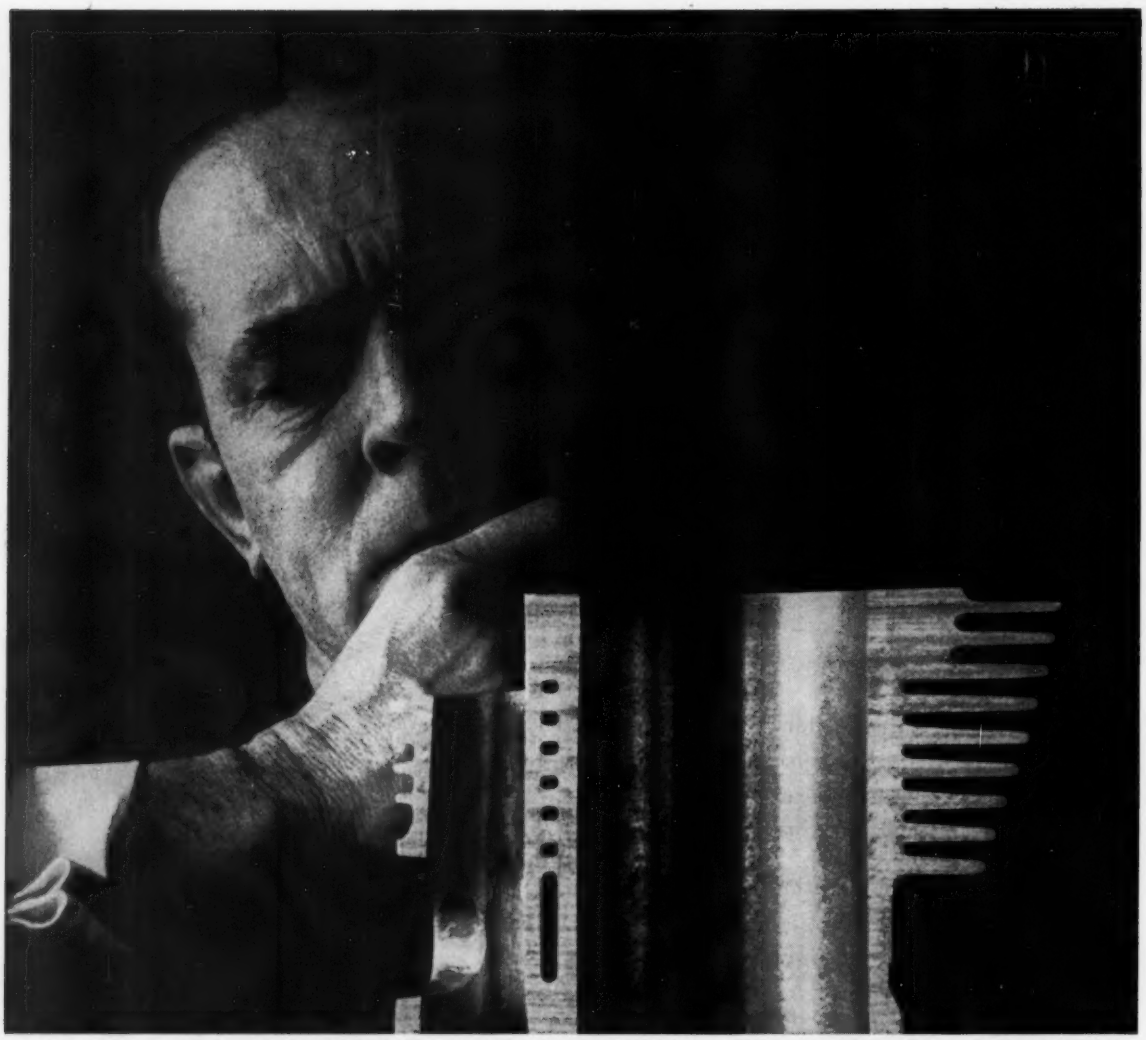
A copy of the "H-W" Buyer's Guide—a useful and informative book, is yours for the asking.

Hickman, Williams & Company

CHICAGO • DETROIT • CINCINNATI • ST. LOUIS • NEW YORK
CLEVELAND • PHILADELPHIA • PITTSBURGH • INDIANAPOLIS • ATLANTA

Established 1890

Circle 703 on Page 53



THE PERPLEXING PROBLEM OF HARD SPOTS

Another costly mystery solved—by the man from Kaiser Aluminum

THE PUZZLING FACTS. An aluminum foundryman recently made a disturbing discovery: his castings contained many inclusions and hard spots. These made the castings very unsatisfactory. In addition, they were difficult to machine—and caused excessive wearing of tool bits.

HOW THE CASE WAS SOLVED. It was a frustrating problem. But the man from Kaiser Aluminum found the fault: ineffective fluxing and degassing techniques. When these were corrected, the hard spots disappeared and production returned to normal.

WE LOVE A MYSTERY. This is one of many actual cases solved by Kaiser Aluminum working with a customer. Perhaps *you* have a mystery one of our engineers might help solve? He'll give you expert advice on any casting problem—including conversion from cast iron to aluminum, mold and die design, alloy selection, heat treatment, finishing, fluxing, metal transfer.

FULL ALLOY AVAILABILITIES. Kaiser Aluminum can supply you *fast* with a wide selection of casting alloys to suit any engineering requirement—from general purpose, low stressed alloys to high purity alloys having good properties at elevated temperatures.

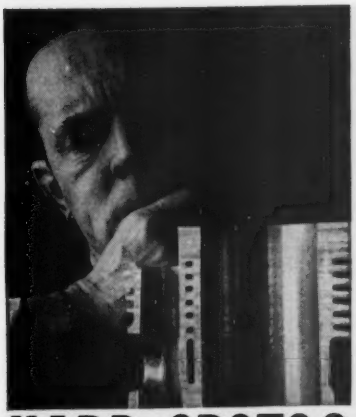
FOR PIG AND INGOT with a free sleuthing bonus, call your nearest Kaiser Aluminum sales office or any of the distributors listed on the opposite page. Or write to: Kaiser Aluminum & Chemical Sales, Inc., Kaiser Center, 300 Lakeside Drive, Oakland 12, California.

KAISER ALUMINUM*

THE BRIGHT STAR OF METALS

*Trademark Kaiser Aluminum & Chemical Corp.

See "MAVERICK" • Sunday Evenings, ABC-TV Network • Consult your local TV listing.



HARD SPOTS?

Your Kaiser Aluminum ingot distributor is more than a nearby source for aluminum pig and ingot. He's ready to render specialized advice on anything from alloy selection to fabricating methods. And "Service" is his middle name!

CALL YOUR NEAREST

KAISER ALUMINUM*

INGOT DISTRIBUTOR:

BENTON HARBOR, MICHIGAN
Michigan Standard Alloys Sales Co., Inc.
WAlnut 5-2195

BUFFALO, NEW YORK
Samuel Greenfield Co., Inc.
HUMboldt 4050

CHICAGO, ILLINOIS
R. Lavin & Sons, Inc.
Virginia 7-1800

CLEVELAND, OHIO
Alloys & Chemicals Mfg. Co., Inc.
ONtario 1-8600

DETROIT, MICHIGAN
Alloys & Chemicals Mfg. Co., Inc.
WOodward 2-6414

FAIRFIELD, ALABAMA
W. J. Bullock, Inc.
STate 8-6586

GRAND RAPIDS, MICHIGAN
Liberman & Gittlen Metal Co., Inc.
GLendale 8-1361

HOUSTON, TEXAS
Gulf Reduction Corp.
WAlnut 6-2425

LOS ANGELES, CALIFORNIA
Aaron Ferer & Sons, Inc.
MAdison 5-1553

PHILADELPHIA, PENNSYLVANIA
George Sall Metal Co., Inc.
Pioneer 3-2828

WEST SPRINGFIELD, MASSACHUSETTS
New England Smelting Works, Inc.
REpublic 4-6491

*TRADEMARK KAISER ALUMINUM & CHEMICAL CORP.

Circle 704 on Page 53

chilled iron abrasives. But savings on maintenance are meaningless if the desired cleaning speed and finish are not obtained with these annealed iron or steel abrasives.

Abrasive Consumption—This is a subject on which foundry operators never have agreed. In a midwestern city, one large automaker has a foundry which will use nothing but the best shot and grit available. On the other side of town is another automaker's foundry where the least expensive abrasive material is the only one considered for use. Both plants maintain the highest production standards, but one feels that using high quality shot and grit gives him lower overall cost. In theory and in practice, this idea is the most widely accepted.

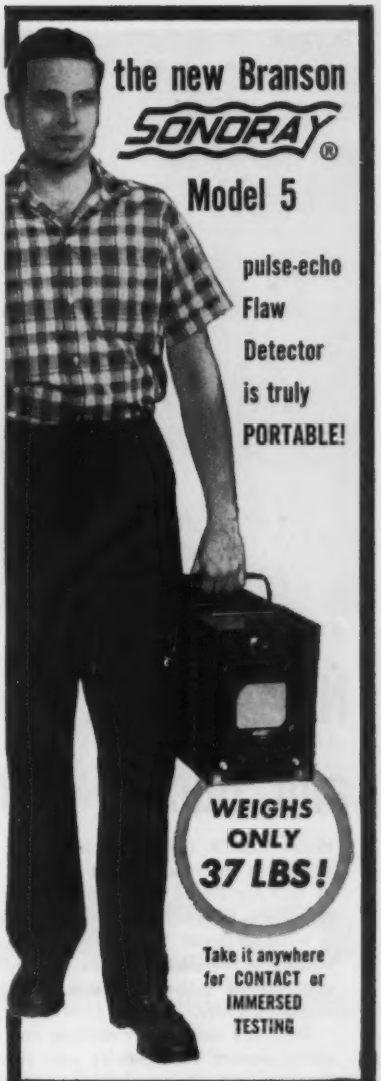
Just how is shot and grit consumed? Contrary to the old-time idea that abrasives shatter in one step from a whole piece to dust, they actually break into halves, quarters, eights and so forth. As larger pieces break, impact tends to round off the smaller pieces.

As shot and grit break into parts of their original size, they develop their own operating mix to produce the correct impact and correct coverage to do the job. For this reason a blast-cleaning system never should be emptied completely even to test a new abrasive. A test can be performed by adding the new abrasive to the system as normal shot replacement until enough has been added to equal the abrasive capacity of the equipment.

For example, if the abrasive capacity of the machine is 1000 lb, the new shot should be added to the system at normal intervals until a total of 1000 lb has been placed in the equipment. Time, quality, and consumption testing should begin at this point. By following this practice, the normal operating mix is maintained, and no operational upset occurs. It is important that when replenishing a system or when performing a test, the shot added should be no larger that that used originally.

Finish—The casting finish needed is a factor which must be considered for each different job. Because the correct finish is the reason for doing the job, its attainment must be considered first.

Blast cleaning efficiency is a



Any frequency from 0.4 to 10.0 mc/s without tuning, by a simple change of transducers — with the most nearly perfect acoustical "picture" of internal structure obtainable today. And, as with all Branson products, service nationwide is assured at all times. For full information about the all-new SONORAY® Model 5, send the coupon today to Branson Instruments, Inc.

BRANSON: Send Bulletin T-203 on the new SONORAY® 5 to

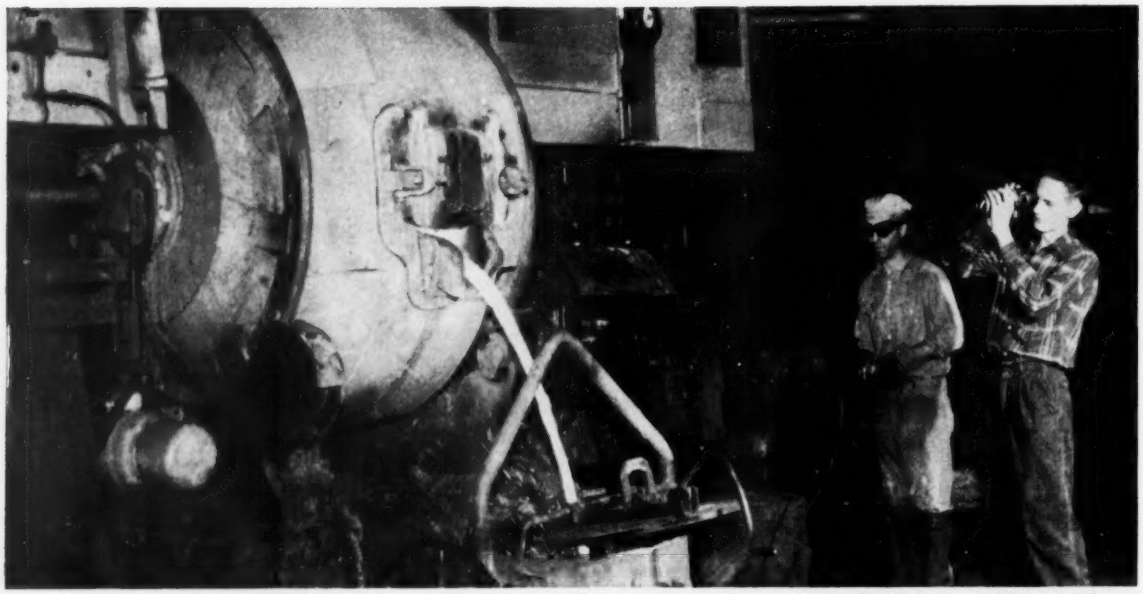
NAME_____

FIRM_____ DEPT._____

ADDRESS_____

BRANSON INSTRUMENTS, Inc.
60 Brown House Road • Stamford, Conn.

Circle 705 on Page 53



A heat of alloy iron being poured from a 1500-lb. capacity Type AAH Detroit Electric Furnace in the Westinghouse Air Brake foundry.

Nine Detroit ROCKING Electric Furnaces Melt Brass and Ductile Iron for Westinghouse Air Brake Co.

Brass, ductile iron, gray iron and special alloys are melted in the nine Detroit Rocking Electric Furnaces at the Air Brake Division foundry of Westinghouse Air Brake Company.

Whether your foundry produces one product or a variety of metals and alloys, Detroit Electric Furnaces can provide melts of consistent high quality and do it economically.

Detroit's indirect arc melting and automatic rocking action assure homogeneity and close analysis control through heat after heat. Using quickly interchangeable shells, a single Detroit Furnace can melt different alloys with a minimum of downtime. Simply exchange shells, set the desired melting cycle and the furnace is ready for charging. You get full utilization of furnace capacity plus high quality results.

Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your melting requirements.

DETROIT ELECTRIC FURNACES

Kuhlman Electric Co.
Bay City, Michigan

A battery of six 750-lb. capacity LFYH Detroit furnaces melt bronze of more than a dozen specifications.

A Westinghouse Air Brake man records a heat of ductile iron melted in Type AAP Detroit Furnace with motorized electrodes.

STOP IN AT BOOTH 920 AT PHILADELPHIA FOR INFORMATION AND NEW LITERATURE ON MELTING FURNACES!

matter of impact and coverage. Large pieces will have greater impact, while smaller pieces give greater coverage. In some instances the larger pieces will scatter the shot, creating untouched surfaces. It may be necessary to increase the cleaning cycle time to do a thorough cleaning job. Small pieces, on the other hand, generally will produce great coverage, but may not have enough impact to produce the required finish.

Getting the correct finish means getting the exact balance of impact and coverage in an operating mix. Selection is often a trial-and-error matter, starting with fairly large size shot and gradually adding smaller shot until the best job is done in the shortest time.

Of course, shot size is just one factor in the big question of abrasive consumption. Selection of the right hardness shot can favorably affect consumption, time, and machine wear. The accompanying photomicrographs show structure of different types of metal abrasives. The Rockwell C hardness rating and analysis of each are given along with a description of the structure and its effect on durability and cleaning efficiency of the shot.

Making casting finish work a profit-producing operation depends on proper consideration of the variables encountered with every job. The foundryman who finds the best combination to suit his type of work is the one who will have the greatest success.

"I don't care whether it'll only do 600 pieces a day. I want it to do 1800 a day. Got it?"

A Report on

CHICAGO

grinding wheels for metal fabricators and foundries

Today, the Chicago Type 11 Taper Cup, pictured above, is the safest, fastest, most economical wheel for metal fabricators and foundries.

Users of grinding wheels on metalworking and foundry applications can expect the ultimate in engineering design and maximum safety from every Chicago Wheel. We offer you a wide range of wheels including straight and depressed center Reinforced Resinoid—Type 27 Hi-Ply, Chicago Flex; Type 11 Resinoid Taper Cups with Carroll pressed metal safety backs; and a complete range of mounted wheels.

We would like to hear from you regarding your particular application. There is a Chicago Wheel sales representative in every major industrial area, ready to serve you.

Write for Chicago Wheel Bulletin F-80
Special catalog for metal fabricators and foundries illustrates grinding wheels, gives you prices and quantity schedules. Write for your free copy today.

CHICAGO WHEEL
& MFG. CO., 1101 W. Monroe Street
CHICAGO 7, ILLINOIS

deburring small parts

smoothing large castings

chamfering structural steel

weld grinding

Circle 707 on Page 53

"INTERNATIONAL"

PRESENTS A BRAND NEW LINE OF TOP-ENGINEERED

Muller

Mixers — 12" 24" 36" 50" 65" 82"

For BETTER BATCH and MOISTURE CONTROL

Fast Muller Speed, Quick Discharge and Larger Batch Capacity... Notice that Mullers do not track.

●●

Extra large Discharge Door in Pan Bottom, operated with Air-pressure.

●

Oil mist lubricating system for air cylinders

You've never seen anything like the productive performance and perfect results you can get out of these thoroughly new International Muller Mixers!

Over 40 years of Foundry and Mixing Machinery Experience has gone into their design, testing and engineering—So this is not an assembly of old and time-worn ideas, but an entirely new machine—NEW in every way—even in output and principles of basic efficiency.

GET ALL THE FACTS TODAY! Let us send you full information and actual figures without cost or obligation. Find out how you can begin to get better results at less cost and expense immediately! Write, phone (Dayton BA 8-1234) or wire for the answers to your sand mixing problems.

A PRODUCT OF International CLAY MACHINERY OF DELAWARE, INC.

New York Office
15 Park Row, New York 38

P. O. Box 14, Far Hills Branch,
DAYTON 19, OHIO

Epoxy Plastic Pattern Equipment Here to Stay

New Material Proves Self For Foundry Applications

By **WALTER H. P. SIEBERT**
Production Manager
Cleveland Standard Pattern Works
Cleveland

Some years ago, the first reports were heard of a new material for patterns. Everyone listened eagerly. Would this material be the fulfillment of the joke about putting a drawing and some shavings into a machine, mixing well, and pulling out a pattern? Let's look back over the past decade and see what happened.

The magic word became "epoxy," and now that its growing pains are over, it clearly is here to stay. Some criticisms of epoxy still circulate, but they aren't realistic. There are those who never give anything that is new a good try. These people use the wrong approach, make faulty patterns, and generally condemn the process. Another group always is too busy to try it.

Let's analyze this negative approach. What is the past history of epoxy? After the first, hardy souls tried it, everyone wanted in, and the trial-kit business boomed. At this stage, good experience and technical help were hard to come by, and skin irritations from the materials caused some people to become discouraged. Others, like ourselves, stuck it out.

In trying to improve by trial and error, however, many of us saw a lot of money go down the drain. In addition, because some of the first samples foundrymen received proved unsatisfactory, customer resistance developed. Some foundrymen also still had a bad taste from patterns made of early resins, used before the advent of the epoxies.

As we began to feel that some of the applications were advantageous, our methods improved, failures were fewer, and eventually we were in the plastics business. In common with every experimenter, however, we still had things to learn. Many applications just would not work out, and every job had to be analyzed as to its merits as an application for plastics.

Corebox Applications — We feel,

THE "NATIONAL" DUAL PURPOSE FLUXES

CASTFLUX
TRADE MARK REG.

NATCO
TRADE MARK REG.

DECARBONIZED... IMPROVED

and HI-HEETE
EXOTHERMIC COMPOUND

AFS
CASTINGS CONGRESS
and Exposition

Castflux and Natco unconditionally guaranteed against any undue carbon segregation and pick-up. Produces better steel, malleable iron and gray iron casting and ingots. See us for details about these amazing hot topping and riser compounds.

REPRESENTATIVES WITH WAREHOUSE STOCKS

M. A. Bell Company
5802 Colfax Street
HOUSTON 20, TEXAS

F. F. Shortsleeve Co., Inc.
P.O. Box 53, Southside Station
ELMIRA, NEW YORK

Fenton Foundry Supply Co.
134 Gilbert Street
DAYTON 3, OHIO

Gordon Sondraker & Co.
4700 East 48th Street
LOS ANGELES 58, CALIF.

Carson Marshall & Co.
1220 W. Cumberland St.
PHILADELPHIA 33, PA.

Western Foundry Sand Co.
1039 Elliott Avenue, W.
SEATTLE 99, WASH.

Western Foundry Sand Co.
208 S.E. Hawthorne Blvd.
PORTLAND, OREGON

Take a breather and rest yourself at
NATIONAL'S EXHIBIT
BOOTH 1424
AFS Castings Congress and Exposition
Convention Hall, Philadelphia
MAY 9-13
We're looking forward to meeting our old friends and making new ones. Plenty of seating space to relax and refreshments. Make it your stop-off.

NATIONAL PIGMENT COMPANY, INC.
Orthodox Street at Delaware River, Philadelphia 37, Pa.

Circle 709 on Page 53

first, that coreboxes are a good application for plastics except in the highest and lowest production ranges. Many good wood coreboxes now in use could be converted inexpensively. It should be noted, however, that many such conversions never should have been made. Each job must be analyzed as to its costs in wood, plastics, or aluminum. If cost is not the most important factor, the job should be evaluated for wear quality. For a given job, wood may perform better than any other material does.

Easy Conversion — Perhaps one of the greatest advantages of pattern and corebox conversion to plastics is the ease with which a single-shrink experimental wood pattern can be made into production equipment to include as many patterns as desired. Converting such a pattern or corebox eliminates the need for a double-shrink master pattern, thus saving dollars for the customer. Plastic patterns which were converted from wood in this manner are very durable in the foundry.

Another widely accepted technique is that of converting core plugs to coreboxes. Such conversion usually is made when a complicated core or core assembly is required. After a good checkout, core plugs can be made into a plastic corebox with the certainty of absolute accuracy. This application is one in which the cost of plastics can be less than that of wood, even if only a wood corebox is ordered. There is no limitation to the size of a plastic pattern or corebox.

Plastics Open Markets—Plastics also can open such new fields to the patternmaker as production of dies, tools, fixtures, models, etc. The automotive and aircraft industries are the largest users of fiberglas-reinforced epoxies. It makes good sense, therefore, to cultivate this market of nonpattern applications. Even now, many pattern shops have a separate department which caters to customers who want plastic dies and fixtures.

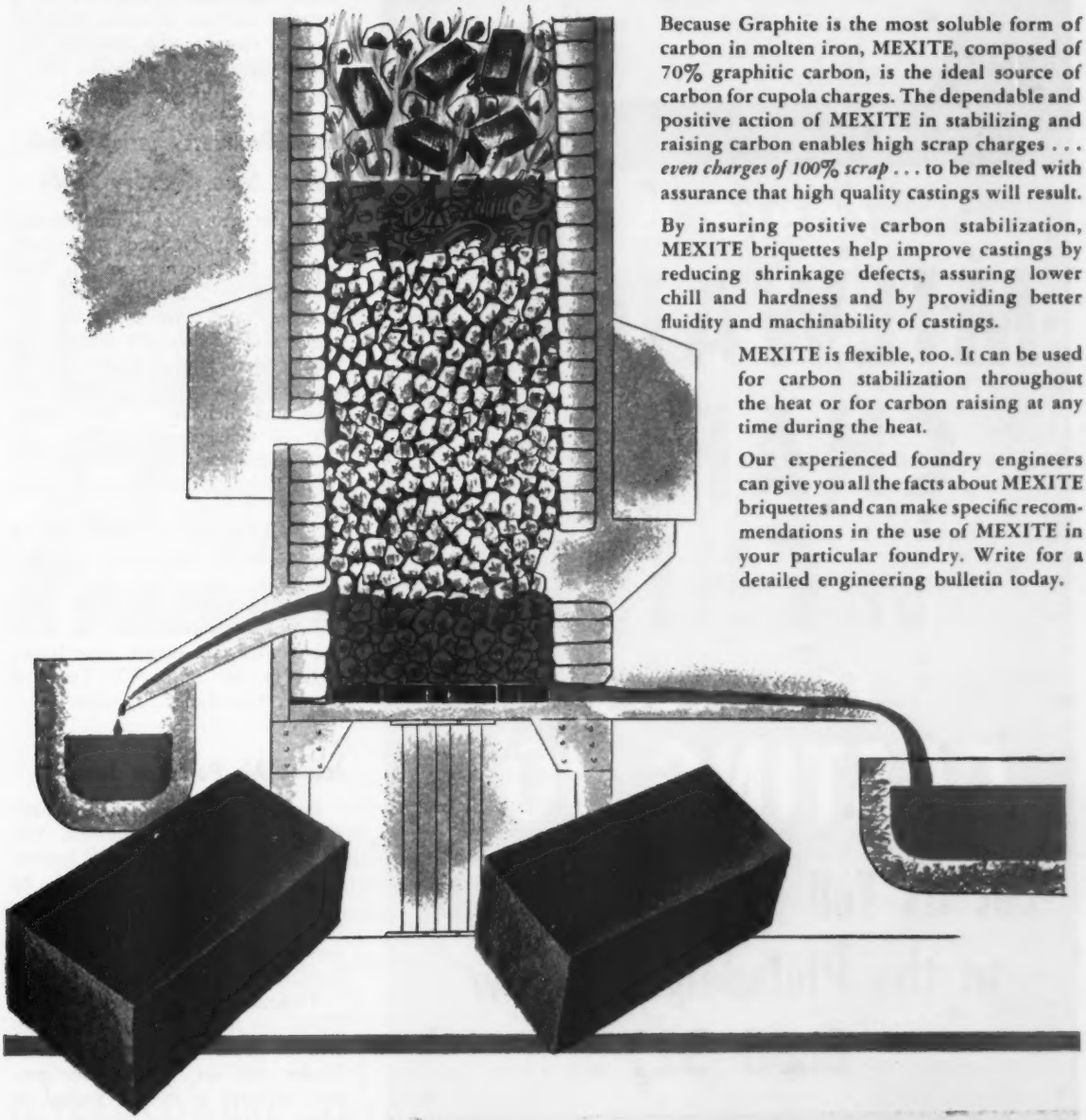
The foundry industry is lagging sadly in making the best use of epoxy in many areas, but in others the demand is very good. In our shop, we have made nonpattern plastic parts weighing up to 1 ton, including its metallic backing. Patterns and coreboxes have not exceeded perhaps 200 lb.

Plastics and Aluminum—A question commonly asked is whether plastics or aluminum make the better pattern. This question is just as silly as "How high is up?" Plastics have better wear quality, but poor shock resistance. It makes good sense, therefore, to combine

ON Your CUPOLA...
WHAT COULD BLOWER BREAKDOWN
-Cost You?
Probably plenty! That's why . . . on original equipment or for replacement . . . foundrymen prefer SPENCER blowers, superior on many counts, including:
DEMONSTRATED DEPENDABILITY—Thousands in use for many years with no down time.
ACCURATE AND INSTANTANEOUS CONTROL—Available only with Spencer blowers.
MINIMUM MAINTENANCE—Simple, rugged construction (lightweight impellers the only moving parts) lessens need for attention or adjustment.
ADAPTABILITY—Eight different discharge arrangements available.
SIMPLIFIED MOUNTING—No bolting down, grouting or special foundations required.
REQUEST CATALOG 126B
The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT
SPENCER

"You shouldn't have done it, fellas"

YOU CAN CHARGE MORE SCRAP IRON AND GET HIGH QUALITY CASTINGS WITH MEXITE® (GRAPHITE BRIQUETTE)



Because Graphite is the most soluble form of carbon in molten iron, MEXITE, composed of 70% graphitic carbon, is the ideal source of carbon for cupola charges. The dependable and positive action of MEXITE in stabilizing and raising carbon enables high scrap charges . . . *even charges of 100% scrap* . . . to be melted with assurance that high quality castings will result.

By insuring positive carbon stabilization, MEXITE briquettes help improve castings by reducing shrinkage defects, assuring lower chill and hardness and by providing better fluidity and machinability of castings.

MEXITE is flexible, too. It can be used for carbon stabilization throughout the heat or for carbon raising at any time during the heat.

Our experienced foundry engineers can give you all the facts about MEXITE briquettes and can make specific recommendations in the use of MEXITE in your particular foundry. Write for a detailed engineering bulletin today.

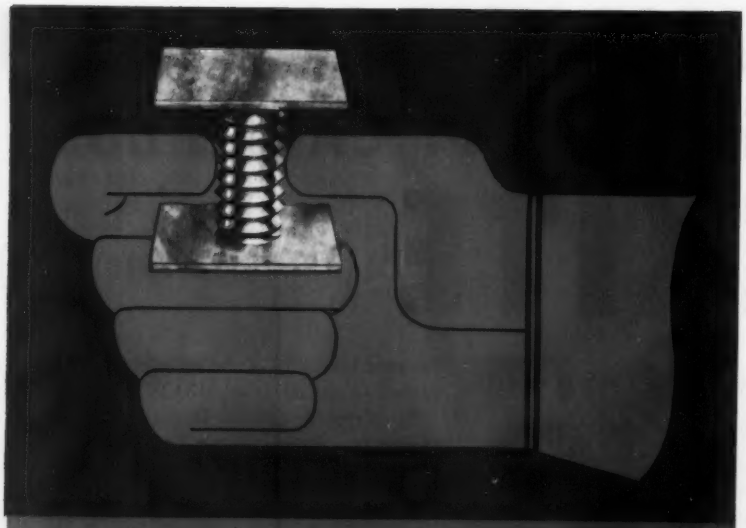
262

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

Circle 711 on Page 53



There is a
MILWAUKEE
CHAPLET
or CHILL
for every
CASTING JOB
Let Us Tell You All About it
at the Philadelphia Show
Booth 327

Milwaukee Chaplet & Mfg. Co.
1025 SOUTH 40th STREET • MILWAUKEE 46, WISCONSIN

the two materials for good results. To do so, prepare thin sections, such as ribs, sharp corners, and angles in aluminum. When firmly fastened in the mold, such pieces bond excellently with plastics.

Another frequent question is, "Which is cheaper, plastics or aluminum?" This question is as unanswerable as the first one. Each job must be evaluated individually. Plastics often are cheaper, but lowering the costs of plastic patterns requires the use of sound methods. In our opinion, the fiberglas-reinforced epoxy method is the best.

Steel Founders' Society Book Covers Steel Foundry Sands

Six lectures on the "Fundamentals of Steel Foundry Sands" are available in book form from the Steel Founders' Society of America. The lectures were prepared and presented at the Society's 1959 Technical and Operating Conference by national authorities on clays and sand and their use in the production of steel castings. The book was edited by Charles W. Briggs, SFSA technical and research director.

The 152-page book costs $4. A similar book, containing six lectures on "The Flow of Steel in Molds," given at the 1958 T&O Conference, is available for $3.50 per copy. To obtain the books, write to the SFSA, 606 Terminal Tower, Cleveland 13, Ohio.

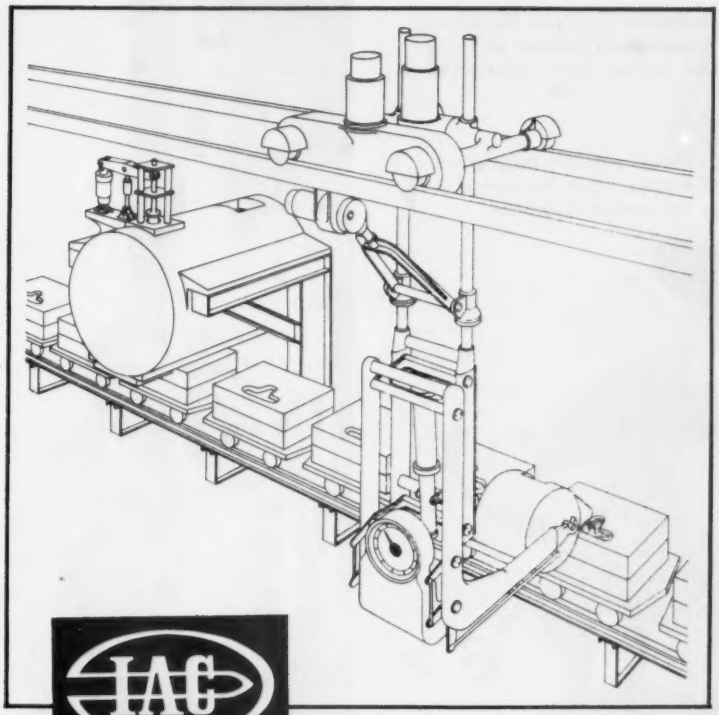
Issues Air Pollution Journal

For those interested in the growing problems of air pollution, Vol. 1, No. 1 of the *International Journal of Air Pollution*, published by Pergamon Press, 4 and 5 Fitzroy Square, London W. 1 (price $17 per volume) carries interesting information.

Technical provisions of the British Clean Air Act, which became effective in June, 1958, are included. Under this act, smoke from general industry is strictly limited in terms of density and duration and prior approval of apparatus for grit and dust collection is required.

Prof. A. J. Haagen-Smit, division of biology, California Institute of Technology, is one of the editors of the publication.

Circle 712 on Page 53



this fully automated pouring device

- Saves manpower and metal
- Improves casting yield
- Reduces scrap losses
- Assures perfect pouring rate control
- Eliminates the "human element"

IAC

PRESENTS THE FULLY AUTOMATIC POURING DEVICE
(Patents Pending)

POURMATIC

The POURMATIC has been developed specifically for the high production foundry. Successfully tested for 3 years in a modern automated malleable iron foundry, it provides the latest advancement in foundry automation and pouring technology. You will be interested in the substantial savings which this automatic pouring method can bring to your operation. Write today for further details.

INTERNATIONAL AUTOMATION CORP.

121 HURON VIEW BLVD., ANN ARBOR, MICHIGAN

Phone NOrmandy 2-1342

"SEE IT IN ACTION"
Booth No. 1335
Philadelphia Show

Fill out, tear out, and mail this coupon today

INTERNATIONAL AUTOMATION CORPORATION

Gentlemen:
Please send me further information on the I.A.C. POURMATIC

NAME .....

TITLE .....

COMPANY .....

.....

ADDRESS .....

.....

Circle 713 on Page 53

Pegasus, a 30-inch figure in bronze, was sculptured and cast by Alfred Duca, research associate in metallurgy, Massachusetts Institute of Technology. The pattern for the figure was carved from polystyrene

Mr. Duca is shown with the polystyrene model of a crucifix figure he carved in preparation for casting in bronze

Polystyrene Pattern Simplifies

CASTING OF STATUARY

● A NEW METHOD of casting art objects uses foamed polystyrene plastic models and is claimed to be simpler and far less costly than traditional processes.

Foamed polystyrene is a lightweight, stiff, porous plastic which resembles a block of snow and is made in densities ranging from 1.8 to 6 lb per cubic foot. One of its most common uses is in Christmas decorations. Use of this material to form a model or pattern for casting art objects was developed by Alfred M. Duca, a professional artist and a research associate in the department of metallurgy at Massachusetts Institute of Technology, who calls the new technique the "foam vaporization" method.

Mr. Duca first experimented with polystyrene as a sculpture material 10 years ago. At an exhibition of his sculpture last year, he met Prof. Howard F. Taylor of MIT, who holds the country's first endowed chair in foundry metallurgy.

As a result of their mutual interest in reviving art castings, Professor Taylor brought Mr. Duca to the MIT staff to do research in casting sculpture. With Professor Taylor's co-operation and support, Mr. Duca received a $10,000 grant from the Rockefeller Foundation to study ways in which a revival of interest in art casting could be brought about.

He is investigating three approaches: 1. Can the lost wax process be adapted to modern casting methods to make it less costly? 2. Can any ways be developed to duplicate existing sculpture readily? 3. Can new techniques be developed which would enable a sculptor to cast more economically? Perfection of the foam vaporization process was an outgrowth of the last of these.

The new process is said to be much simpler than the lost wax method. A statue is carved from a block of polystyrene with simple tools such as knives and files. Then the carving is enclosed in a conventional sand mold, which is bonded with sodium silicate binder and hardened by carbon dioxide gassing. When the metal is poured, the polystyrene vaporizes, and a finished casting is produced.

Professor Taylor states that the foam vaporization method has many advantages. "This process provides an extremely versatile medium in which to work," he said. "When modeling is done in clay, mechanical supports often are needed to hold the model together because of its weight and lack of rigidity. Polystyrene gives much more structural freedom because such supports are not needed. Statues can be carved and cast which previously would have been impossible.

"The process provides a faithful reproduction of the original shape

Sand is only part of the picture

INCREASE PRODUCTION WITH FAST-ACTING

SMITH L-O "45" LIQUID PARTING

This low-cost, time-proved liquid formulation provides a smooth, uniform coating that permits molding sand to slip free from the pattern. One application of this advanced product will give perfect results up to 40 molds.

Smith L-O "45" is ideal for sand-slinger operations as the hot sands do not remove the film produced by the parting. Surfaces are completely sealed against absorption of moisture, and faster, more accurate work results. The Smith Foundry Service Man in your area will be glad to demonstrate this highly efficient product. Let him prove that Smith L-O stands for a service as well as a product.

SMITH REPRESENTATIVES

- ALGONQUIN CHEMICAL CO., INC. Hamburg, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- ATLAS FOUNDRY SUPPLY CO. Santa Ana, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 19, Indiana
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts
- OVERSEAS COMMODITIES, LTD. Vancouver, B.C., Canada

SMITH OIL & REFINING CO.

INDUSTRIAL DIVISION

ROCKFORD, ILLINOIS

Circle 714 on Page 53

—in fact, the original shape 'turns into' the casting by being completely replaced by metal. It thus preserves the 'organic vitality' of the work.

"Because of the costs involved, art casting of sculpture has nearly disappeared from the American scene. Sculptured pieces are sent to be cast in Europe, a procedure which is expensive and time-consuming. The foam vaporization method is much cheaper and is easily carried out since it can be fitted into existing foundry facilities. The material itself is readily available

Polystyrene carving employed as pattern for bronze Pegasus

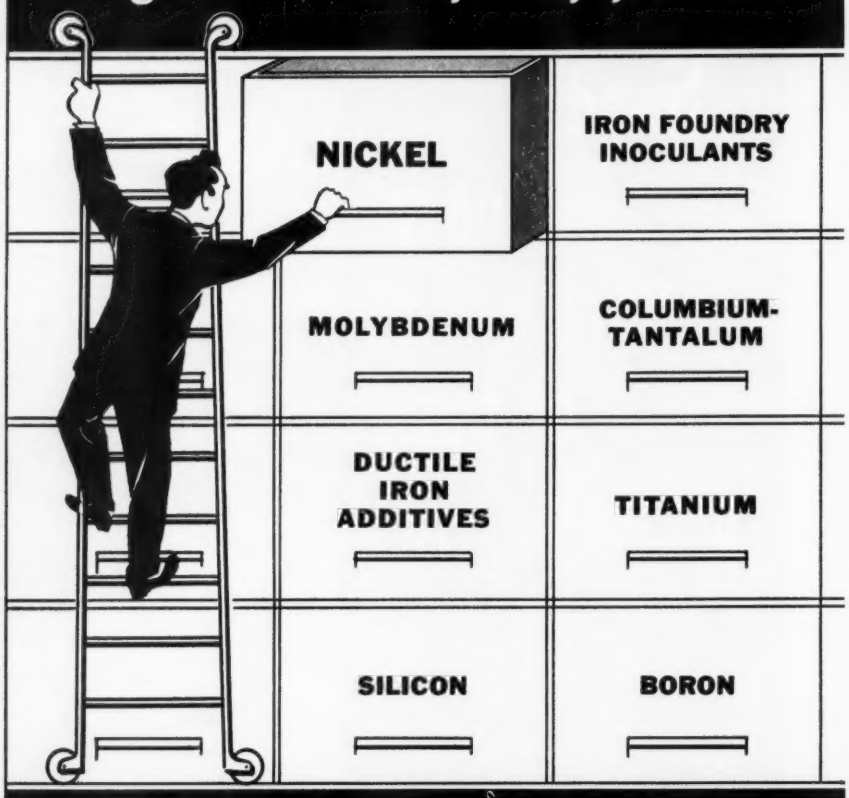
and is no more expensive than wood.

"Because it simplifies the mechanics of casting, more of the creation of a work of art rests in the hands of the artist. He has more direct control over the outcome and does not have to rely so heavily on craftsmen of various types."

Mr. Duca wants to make several modifications in the process—for example, developing a more tactile material so that the artist can model directly with his hands rather than with knives and shapers. He also hopes to develop a wide range of surface textures.

The most dramatic work made with the process so far is a 400-lb statue of Pegasus, the winged horse. Other castings made with the new method include a number of minor pieces in ductile iron, the most important of which is a 200-lb piece titled "The Vertebrate." Soon to be cast is a 9-ft "Crucifix" which

You get the foundry alloy you need



at your WHITEHEAD FOUNDRY ALLOY

Over 99 different foundry alloys to choose from

Nickel, Silicon, Chromium, or any one of more than 96 other alloys off-the-shelf – you name it! Virtually all the foundry alloys you could possibly use are at your nearest Whitehead warehouse. You can get handfuls to carloads in the standard sizes and forms you prefer. You'll find the price is right, too!

These foundry alloys are all the quality products of such leaders in industry as The International Nickel Co., Vanadium Corporation of America, and Shieldalloy Corporation.

So, why not check your supply of foundry alloys? If your stocks are low, get what you need, off-the-shelf, from Whitehead.

"Off-the-Shelf"

SILICO-MANGANESE	TUNGSTEN	ZIRCONIUM
MELTING BASE ALLOY	VANADIUM	COLUMBIUM-CHROMIUM
MANGANESE	COLUMBIUM	VANADIUM-ALUMINUM
CHROMIUM	MOLYBDENUM-CHROME	CHROMIUM-TUNGSTEN

"Supermarket"

Plus Items for Foundries:

Welding Rod – Whitehead Metal "Supermarkets" maintain full stocks of a wide range of welding and brazing supplies. Two of the most popular items are Ni-Rod and Ni-Rod "55" Electrodes which many foundries use in salvaging castings with defects, for repairing heavy sections and joining dissimilar metals. Check your Whitehead man for detailed information.

Aluminum Core Plate – Strong, light-weight, easy to use. Good long-lasting flat core plate available "off-the-shelf" from Whitehead.

Fasteners, too – Screws, bolts, washers, etc., in the quality alloys.

WHITEHEAD METALS, INC.

303 West 10th Street • New York 14, N.Y.

Other Offices and Warehouses:
PHILADELPHIA • BUFFALO
HARRISON, N. J. • CAMBRIDGE, MASS. • SYRACUSE
BALTIMORE • ROCHESTER
WINDSOR, CONN.

Circle 715 on Page 53

the artist spent two months carving.

Mr. Duca, a graduate of Pratt Institute and the Boston Museum School, has done a large number of paintings, prints, and sculptures, and his work has been exhibited in many galleries in the United States and in Europe. Five years ago he began independent research in metal casting and three years ago had his first one-man show of bronzes, most of which he had cast himself, at the Boris Mirski Gallery, Boston.

Malleable Iron Castings Subject of New Handbook

Malleable Iron Castings, a comprehensive and up-to-date, 526-page handbook, has just been published by the Malleable Founders Society, Cleveland. The work reflects the authoritative knowledge of the malleable industry's foremost foundry technicians and casting designers.

The editors have taken into account the industry's great progress in recent years, expanding the content of the new publication by more than 40 per cent over the previous edition, published in 1944.

While it covers the basics of foundry operation, the handbook also is intended to help the engineer in design of metal components; the purchasing agent in materials selection, and the production planner in processing malleable castings.

New emphasis has been given to the description of pearlitic malleable iron. Since machinability is one of malleable iron's outstanding characteristics, this subject also is covered in detail. Included in the machining chapter are discussions of all the basic operations—turning, drilling, boring, milling, and tapping.

Other chapters are devoted to Uses and Products, Mechanical and Physical Properties of Standard Malleable, Design, Metallurgy, Manufacture, and Alloyed Malleables.

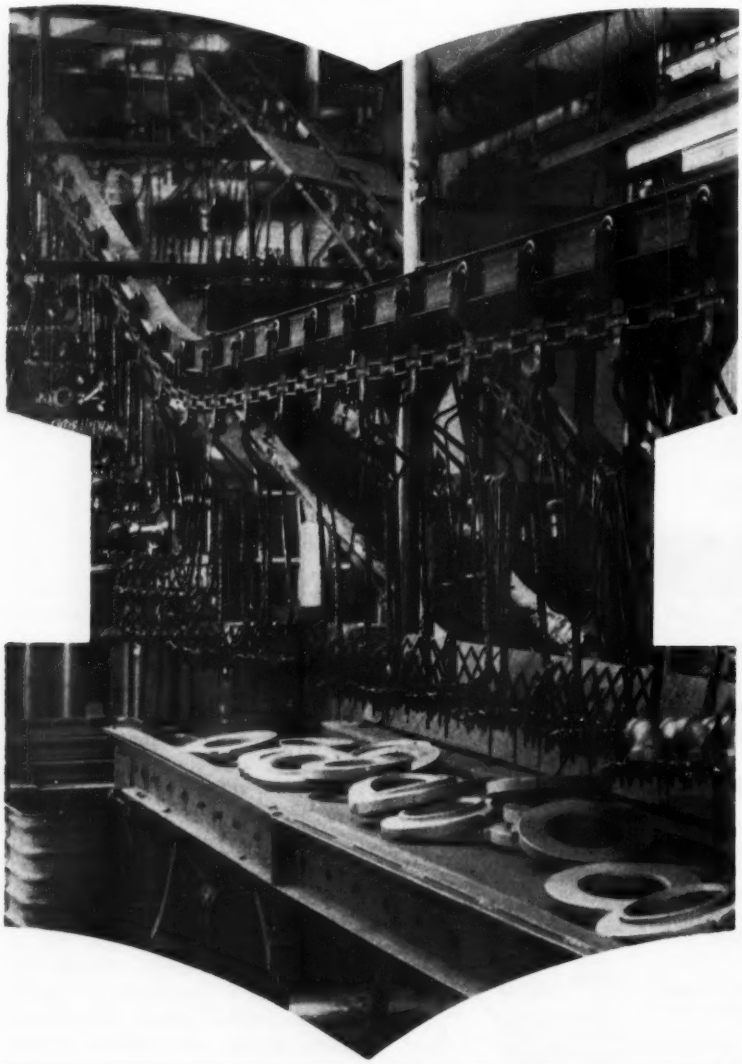
Features of the book also include a 20-page glossary of technical terms and 75 pages devoted to engineering tables.

Price of the new handbook is $10. It is available from the Malleable Founders Society, 781 Union Commerce Bldg., Cleveland 14, Ohio.

MATHEWS . . . A fully integrated conveyer service for the Metalworking Industries

• With 3 large modern plants, competent people in engineering and manufacturing, and 55 years of experience in mechanized handling, Mathews makes available to American and Canadian manufacturers a conveyer service complete in every detail, from proposal engineering through installation.

That is why we can confidently say, when you buy Mathews Conveyers you're sure to get outstanding performance.



GENERAL OFFICES ..... MATHEWS CONVEYER COMPANY
Ellwood City, Pennsylvania

WESTERN DIVISION ..... MATHEWS CONVEYER COMPANY WEST COAST
San Carlos, California

CANADIAN DIVISION ..... MATHEWS CONVEYER COMPANY, LTD.
Port Hope, Ontario, Canada

(Member Foundry Equipment Manufacturers Association)

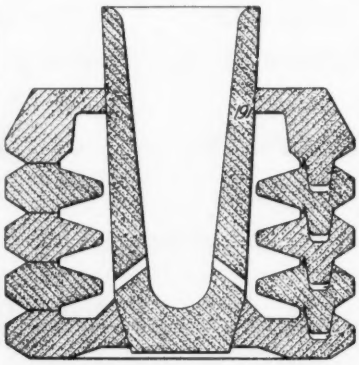
MATHEWS

PATENTS

Of Interest to Foundrymen

Stack Molding

Stack molding with shell molds uses a plurality of mold elements in which both sides of the intermediate mold elements form an impression on the cast article. Each acts as cope and drag and reduces the number of mold elements required. Procedure is particularly advantageous in



producing multiple groove sheaves because the flash left by the mold is on the periphery of the annular projection defining the grooves, and not on the driving surfaces of the grooves. *Patent No. 2,919,479 granted to H. A. Menningen and assigned to Allis-Chalmers Mfg. Co.*

Eliminates Heating

Formation of rigid molded shapes formed of exothermic materials is accomplished without application of external heat by use of alkali hydroxide solution. One example of the exothermic composition contains 38 lb fireclay grog, 22 lb feathery millscale, 18 lb aluminum shavings, 8 lb granulated aluminum foil, 7 lb aluminum powder, 7 lb sodium nitrate, 5 lb powdered fluorspar, 4 lb bentonite, and 4 lb dextrin. That is milled with 10 per cent water and allowed to mature for 8 to 12 hours. Then it is molded to the desired shape and moistened with a small amount of a solution composed of 10 grams sodium hydroxide, 10 grams sodium nitrate, and 200 grams water. In a short time the reaction results in the gen-

2 in 1 CUT-OFF

New swing-frame feature now included in standard Tabor-Brasive Table-Top Machine.

FULL RANGE

Cutting of all alloy steels, nodular and ductile iron.

ECONOMY

Less equipment to buy, space savings, less maintenance, proven Tabor-Brasive performance and design.

Now the best Foundry Cut-Off Machine is available with a swing-frame for full range cutting of alloy steels, nodular and ductile iron. See it at the Foundry Show – Booth 1613

TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PENNSYLVANIA

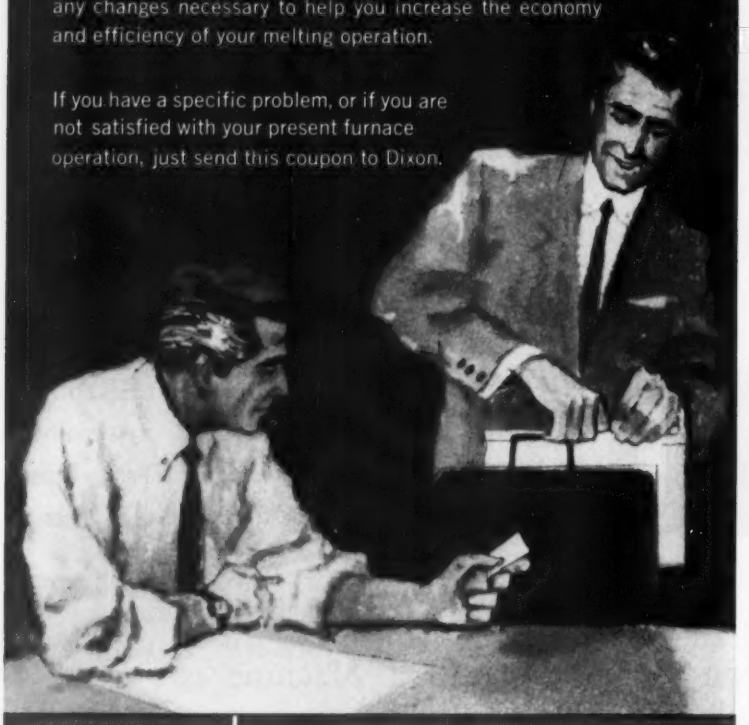
TABOR
TRADE 1884 MARK

DIXON PLACES 133 YEARS OF EXPERIENCE

At Your Service

The knowledge and experience we have gained in the manufacture of crucibles and refractories is freely available to you. Our Field Engineers will be glad to come to your plant, examine your present facilities, and recommend any changes necessary to help you increase the economy and efficiency of your melting operation.

If you have a specific problem, or if you are not satisfied with your present furnace operation, just send this coupon to Dixon.



Be sure to see us at the AFS EXPOSITION Booth No. 402 Philadelphia, Pa.

DIXON

JOSEPH DIXON CRUCIBLE CO., Jersey City 3, N. J.

Gentlemen: *Crucible Division Dept. F-1*

☐ Please send me further information and specification sheets on your crucibles.
☐ Please have your representative call on me.

NAME_____

COMPANY_____

ADDRESS_____

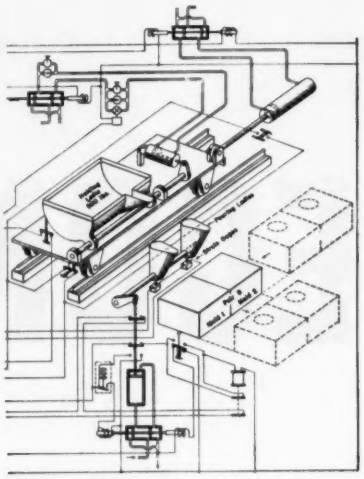
CITY_____ ZONE____ STATE_____

eration of heat which dries the composition into a rigid mass. The drying action is said not to interfere with subsequent use of the molded form as an exothermic agent. *Patent No. 2,891,293 granted to R. P. Forsythe and assigned to Foundry Services Ltd.*

Pouring Control

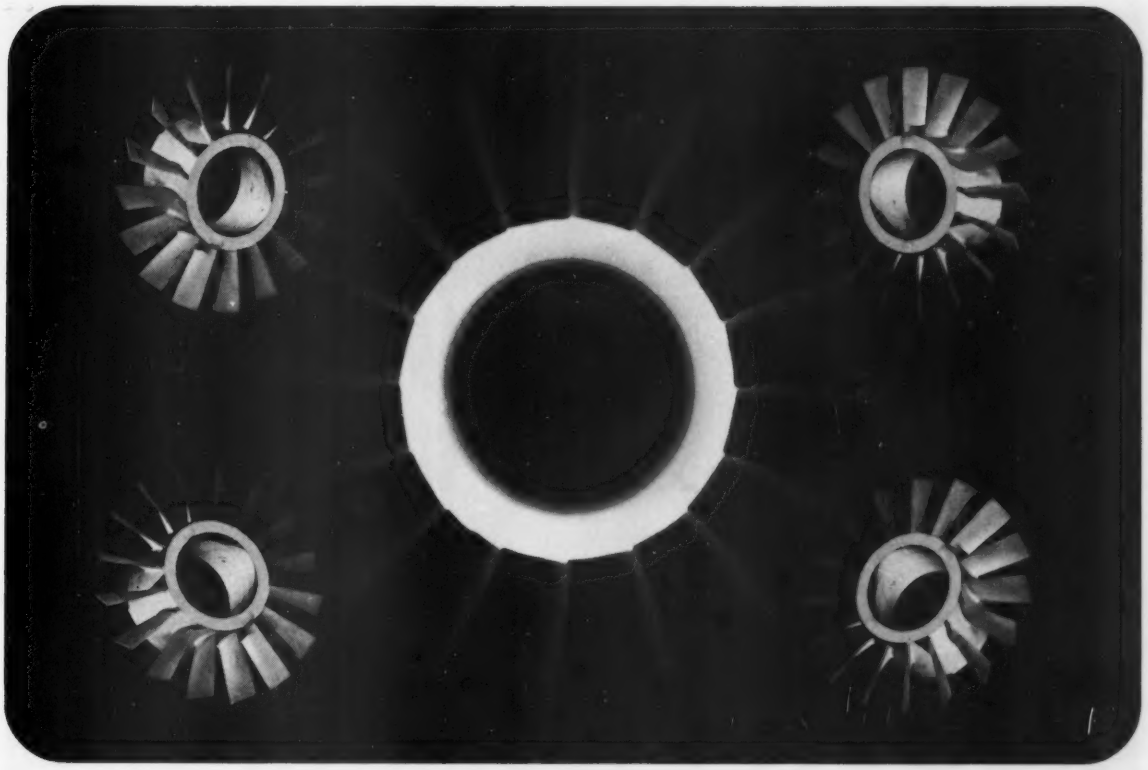
New and improved facilities for automatic weighing and pouring molten metal into pairs of molds reduces the number of operators required to weigh and pour, shortens the time needed to accomplish those operations, and improves accuracy of weighing.

As shown in the illustration, the equipment includes a movable ladle which is controlled through a combination of electrical and mechanical means. The ladle pours metal separately into small pouring ladles attached to strain gages which control the weight of metal poured into them. Equipment is operated through a push button which causes a series of stepping switches to function and perform the various operations automatically. Filling the molds from the pouring ladles is controlled by a separate push button. *Patent No. 2,922,205 granted to T. A. Deakin, S. C. Northington Jr., and J. A. Lasater and assigned to Combustion Engineering Inc.*



Has High Rupture Life

Cast nickel alloys suitable for use under stress at elevated temperatures and characterized by high rupture life under severe stress at temperatures of 1700° F and above contain



Pinwheels for an Inferno

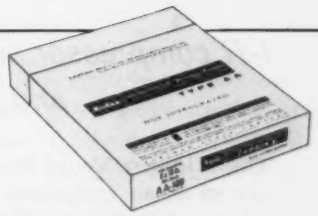
Turbine wheels in today's jet engines face intense heat and ultra-precise operating requirements. Austenal's Microcast Division checks them for soundness with radiography using Kodak Industrial X-ray Film, Type AA

Whirling at fantastic speeds at white heat is no sissy job. It takes castings molded to utmost accuracy to stand up dependably in a powerful jet.

Austenal Company, Microcast Products, casts such intricate parts as these by the "lost wax" method—and to check, lest any flaw lies hidden within, the castings are radiographed on Kodak Industrial X-ray Film, Type AA.

This is the way to be sure only high-quality work reaches the customer. It is a way good reputations are built and new business won.

Wouldn't you like to know how radiography can work for you? Talk it over with an x-ray dealer or write us for a Kodak Technical Representative to call.



Read what Kodak Industrial X-ray Film, Type AA, does for you:

- Speeds up radiographic examinations.
- Gives increased detail visibility and easy readability at all energy ranges because of high film contrast.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

EASTMAN KODAK COMPANY
X-ray Division **Rochester 4, N. Y.**

Kodak
TRADE MARK

I-R compressor supplies air for sandblasting and paint spraying, unaffected by dusty atmosphere

The Midwest Metal Processing Company needed an air compressor to handle a tough job in its Detroit plant. They had to have compressed air for sandblasting and paint spraying, but most types of compressors couldn't withstand the sandy atmosphere—the dusty, gritty air getting into the working parts would soon wear them out.

After investigating the types available, Midwest chose an Ingersoll-Rand ESH compressor. To date the unit has given continuous service without trouble of any kind. Here's why:

In Ingersoll-Rand compressors, all working parts are protected by the tightly-sealed frame construction which keeps out dust and grit—normally the major cause of wear. The frame may be *kept* sealed because there are never any adjustments to make! All parts are precision-manufactured to a perfect, permanent fit. And all parts are continuously lubricated by the full-filtered pressure oil system.

The sealed frame, foolproof adjustment-free construction, and *full* pressure lubrication are by no means the only outstanding advantages of Ingersoll-Rand heavy-duty compressors*. For more information, about all types of compressors from ½ to 7500 hp, call your I-R representative today.

*** Only I-R compressors have Channel Valves**
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact.

Ingersoll-Rand
5A1 11 Broadway, New York 4, N. Y.

COMPRESSORS • GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

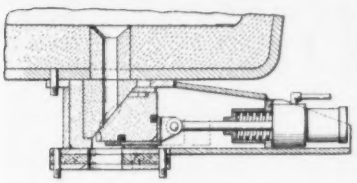
chromium, molybdenum, aluminum, and other elements. Nickel content should be at least 40 per cent and preferably 50 per cent by weight.

One of the several compositions given shows 10 to 17 per cent chromium, 6 by 9 per cent molybdenum, 1 to 3 per cent columbium, 5 to 7 per cent aluminum, 0.3 to 1.5 per cent titanium, up to 0.10 per cent boron, up to 2 per cent zirconium, up to about 15 per cent cobalt, and remainder essentially nickel.

Alloys also may contain carbon, silicon, iron and copper. *Patent No. 2,912,323 granted to C. G. Bieber and G. N. Ziegler and assigned to International Nickel Co. Inc.*

Metal Flow Control

Improved flow control device adapted for attachment to the outer surface of a foundry ladle as shown in the accompanying illustration, consists of two refractory sections with inclined mating surfaces, Angle of inclination preferably is 54 degrees. One of the refractory sections is arranged to be moved horizontally



in relation to the other by a hydraulically or pneumatically operated cylinder and piston.

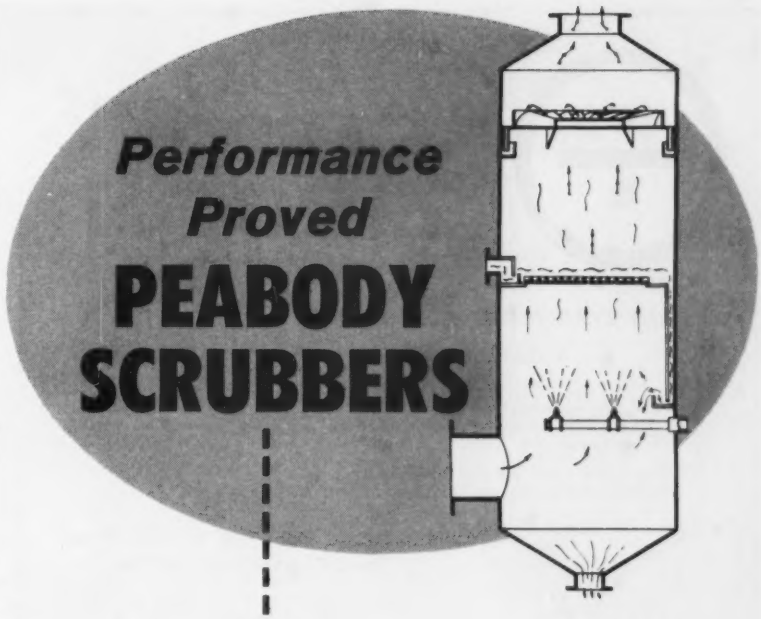
Inclined surfaces of mating parts contribute substantially to long life use of the assembly, reportedly three times that of other types of nozzles. The movable refractory section is more susceptible to deterioration and can be easily replaced. *Patent No. 2,921,351 granted to W. W. Momm.*

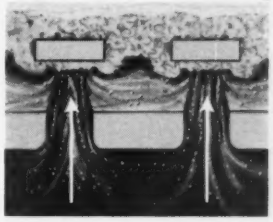
Indicates Flaws

Ultrasonic apparatus for parts inspection includes a wedge-shaped vibration transmission member with a plurality of plane surfaces at angles to each other. A first surface is adapted to be placed on the part to be tested, and the second surface at an angle to the first surface has a transmitting electromechanical crystal transducer mounted on it.

Angle between the two surfaces is such that the beam of high-frequency waves generated impinges

Performance Proved
PEABODY SCRUBBERS





99%+cleaning efficiency on foundry shake-out vents, sand mullers, sand drier vents

Peabody Impingement Baffle Plate Scrubbers are designed specifically to handle dust-laden gases exhausted from foundries. On-the-job performance tests consistently show the average cleaning efficiency of Peabody Scrubbers in foundry service to be in *excess* of 99%, with residual dust loadings well under 0.01 grains per standard cubic foot.

On a recent series of tests made in a Texas foundry, dust loadings entering the Peabody Scrubber were found to be approximately 0.64 grains per standard cubic foot, and residual dust loadings averaged 0.006 grains per standard cubic foot. Tests of the effluent water made during the period of peak dust loading showed that the Peabody Scrubber was picking up 2.5 pounds of dirt per minute, otherwise discharged to atmosphere.

If you have a dust control problem in your foundry, the solution is a modern, efficient, compact Peabody Scrubber. Write today for complete details and a copy of Bulletin 203C.

PEABODY ENGINEERING CORPORATION

232 MADISON AVENUE, NEW YORK 16, N.Y.

OFFICES IN PRINCIPAL CITIES

SUBSIDIARIES
In England: PEABODY LIMITED In Canada: PEABODY ENGINEERING CORPORATION OF CANADA LTD.

0-143

Orefraction
ZIRCON
Sand and Flour

THIS TRADEMARK HAS BECOME
A HALLMARK

Long the trademark of Orefraction Zircon, this symbol has become a hallmark in the Foundry Industry.

As the word Sterling is to Silver, Orefraction is to Zircon. Purity and Uniformity are assured.

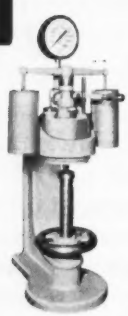
REMEMBER — THERE'S NO BETTER ZIRCON THAN OREFRACTION ZIRCON.

Write for NEW FOUNDRY INDUSTRY DATA SHEET
VISIT US IN BOOTH 714

Orefraction
MINERALS INC.
P. O. BOX 247 ANDREWS, S. C.

Circle 757 on Page 53

It's 'DETROIT' in the Lab and on the Line



Model HB-1

Dependable Brinell testing is yours—in the laboratory and on the production line. Use the simple, rugged HB series tester with its hand pumped hydraulic system in the lab. Use the direct reading, fast-acting DH-1 tester on the line. No grinding of work pieces, and tests are made as fast as the pieces can be handled. Many modifications are available.

Brinell Testing

Model DH-1

Write today for more information about our Brinell testers

DETROIT TESTING MACHINE COMPANY
9382 Grinnell Avenue, Detroit 13, Michigan

Circle 758 on Page 53

on the surface of the part at substantially the critical angle as determined by Snell's law, to generate surface waves in the part. When those waves traveling through the part adjacent to the surface encounter any flaws or cracks, they are reflected to a Y-cut crystal electro-mechanical receiving transducer, resiliently mounted in an aperture in the first face. *Patent No.* 2,912,-854 *granted to N. W. Shubring and assigned to General Motors Corp.*

Gas Condition Eliminated

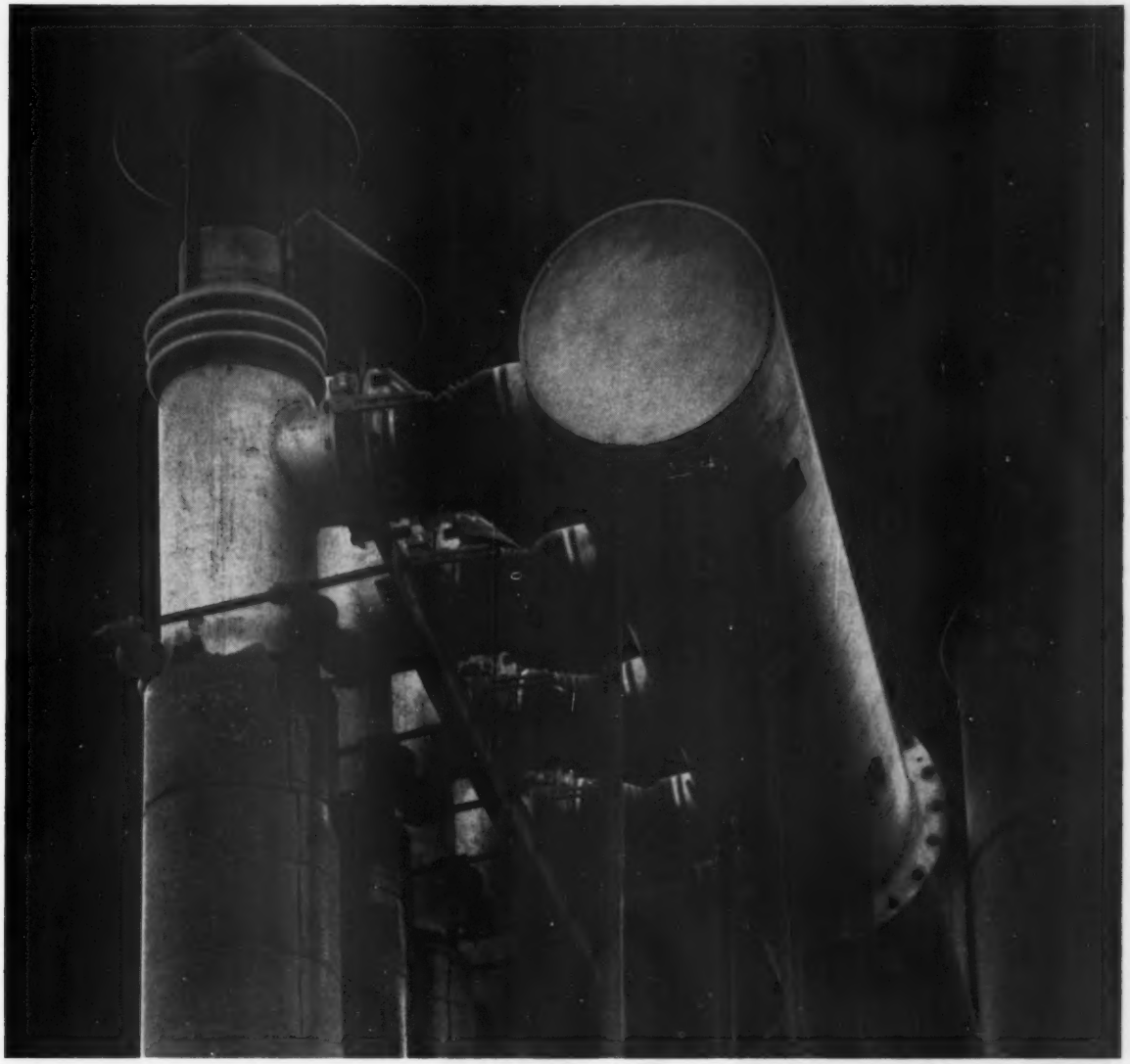
Elimination of a gas condition in 18-8 chromium-nickel steels poured into resin-bonded shell molds is reported to be overcome by adding an oxidizing agent to the molten steel, controlling the silicon content to allow for the presence of the oxidizing agent, and limiting the manganese content.

The oxidizing agent added—preferably in the charge—is nickel oxide in the amount of 1.33 per cent of the charge weight. Silicon content of the charge is adjusted so that in the final steel analysis it is in the range of 0.40 to 0.65 per cent, although in the initial charge calculation it may be 0.85 per cent.

Any necessary silicon addition must be as ferrosilicon rather than the customary calcium silicon and is added to the charge. Manganese content is held below 0.30 per cent. Ferroselenium containing 55 per cent selenium is added in the amount of 4 oz per 1000 lb steel after melting down, to counteract hydrogen porosity. *Patent No.* 2,-913,337 *granted to H. C. Kretz and assigned to Cooper Alloy Corp.*

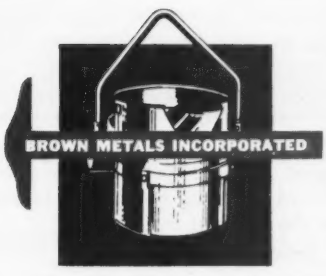
High-Temperature Steel

Austenitic steels for elevated-temperature service are claimed to have exceptionally high strength at temperatures up to 1200 to 1500° F, and require no additions of nickel or cobalt. Contain 0.35 to 0.65 per cent C, 11 to 13 per cent Mn, 0.2 to 0.7 per cent Si, 16 to 24 per cent Cr, 0.30 to 0.70 per cent N, 0.65 to 1.35 per cent C plus N, up to 0.5 per cent V, 0.7 to 2.0 per cent W, up to 1.5 per cent Mo, 0.5 to 1.0 per cent Cb, and remainder Fe. *Patent No.* 2,909,425 *granted to Chi-Mei Hsiao, E. J. Dulis, and Peter Payson and assigned to Crucible Steel Co. of America.*



Obtain Hot profits with Brown Hot Blast equipment

LESS COKE PER CHARGE—Savings in fuel enable heaters to be amortized quickly . . . often in less than a year. **PRODUCES BETTER QUALITY CASTINGS**—Exact blast temperature control and use of hotter metal helps assure production of higher quality products. **LOWERS YOUR SULPHUR PICKUP**—Lower coke consumption reduces the sulphur pickup by the molten iron. **PERMITS GREATER USE OF SCRAP**—Reduced oxidizing zone in cupola allows increased use of steel and cast scrap. *Write for Your Free Copy of HOT BLAST BULLETIN 2000.*



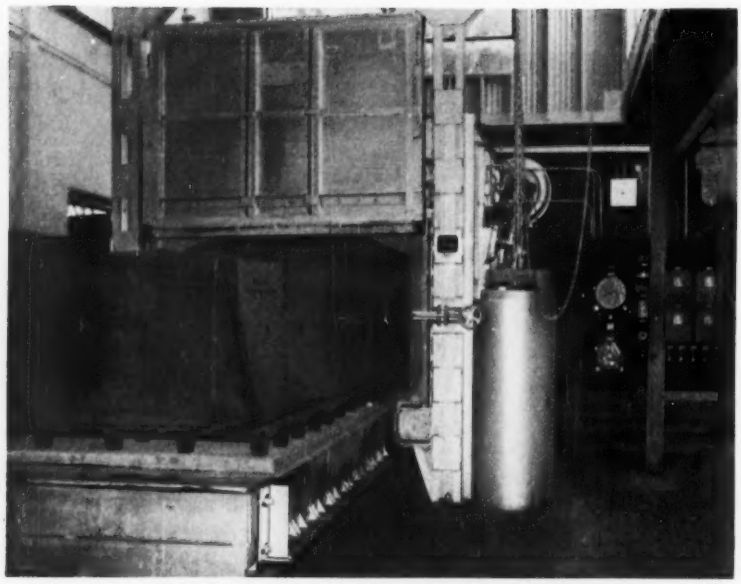
VISIT BOOTH NO. 1210 AT THE AFS SHOW!

BROWN METALS INCORPORATED

302 HURON STREET, ELYRIA, OHIO • PHONE: FA 3-3291

Water-Cooled Cupolas • Hot Blast • Mechanical Chargers • Engineering Service
Hot Metal Holding and Transfer Units • Yard Layout and Storage

Circle 723 on Page 53



Program Heat Treating With A Johnston Car-Bottom Furnace!

Fast, clean, dependable annealing, normalizing, and stress relieving is assured in the advanced design of the JOHNSTON Car-Bottom furnace. Combustion is provided by four Johnston nozzle mixing gas burners, electric ignition, direct connected blower, and jet recirculating system. Heat treating cycles are automatically controlled.

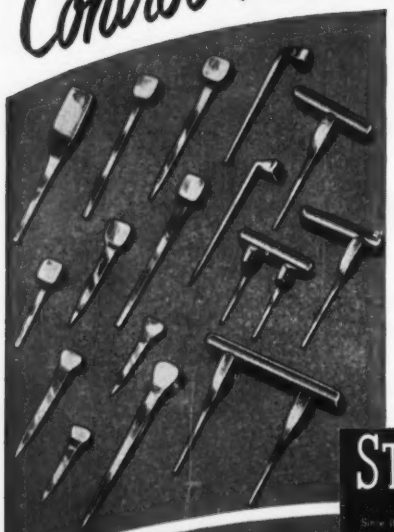
WRITE FOR NEW FREE BULLETIN NO. 1102!

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

Circle 751 on Page 53

Control Foundry Chilling with

CHILL KOOLHEAD NAILS



CHILL NAILS and SPIDERS

Choose any style chill nail from jumbo to stubby; slim, medium, or horse nail blade; blunt, pointed, straight or 90° bent. Same types available in Stainless, Brass, Aluminum; Copper coated to order. Spider Chills, jumbo or horse nail legs—double or single. Available in various sizes and types; also made to your individual specifications.

Write for detailed descriptions and prices.

STANDARD HORSE NAIL CORP.
NEW BRIGHTON, PA.

Other Products
Stanho

64th Castings Congress and Foundry Exposition, Philadelphia, May 9-13.
Visit Our Booth No. 520, Convention Hall

Circle 752 on Page 53

How To Determine Costs Of Accidents Accurately

Realistic Analysis Shows Twelve Hidden Factors

BY ERNEST W. FAIR

A misleading situation in modern shop operation is created when management fails to determine the real costs of accidents. Too often, only the immediate outgo of dollars-and-cents is used as a yardstick. Cost analysis has shown that this figure is far from accurate.

Arriving at the true costs of accidents requires detailed and close analysis of many factors—not just the two or three which are most obvious. Hidden costs of even the smallest accident can eat into profits. Therein sometimes lies the source of hazy or unknown operating expenses and too-narrow margins when receipts are balanced against expenditures.

This study presents 12 factors which enter into the cost of every shop accident. They are necessary to a correct calculation of overhead, and they also emphasize the profit potential of accident prevention measures to members of management who may be skeptical.

Individual Lost Time—The cost of the injured employee's lost time often is discounted as primarily a loss to the individual, rather than to the firm. A loss to the company is created, however, through the absence of the employee's productive ability while he is away from the job. Only rarely does a replacement possess the skill of the injured worker. A direct loss thus ensues in proportion to the amount of difference in productive ability.

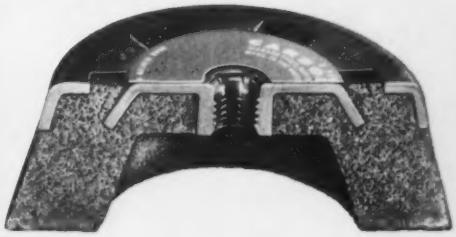
Lost Time of Other Workers—The cost of time lost by employees who stop work out of curiosity and sympathy or to assist the injured individual at the time of the accident can be an important figure. An average interruption can last from a half hour to an hour and involve from one to ten other employees. If only five are involved for a single hour, the cost of the labor and the lost production involved amounts to enough to add to the accident cost analysis.

Supervisory Lost Time—It also is necessary to include the cost of

NEW

cup wheels with "built-in guard"

for all rough grinding applications



- *extra strong*
- *break resistant*
- *positive mounting*
- *no work interference*

Here's a new, portable cup wheel by CARBORUNDUM that offers outstanding safety and performance features for all rough grinding applications in steel mills, foundries, welding shops, etc. The "built-in" guard consists of a one-piece combination steel back and prong-type bushing molded into the fast-cutting resinoid bond. It is easy to mount, eliminates heavy conventional safety guards, and does not interfere with the work piece.

ESPECIALLY DESIGNED FOR USE IN

- *STEEL MILLS*
- *FOUNDRIES*
- *WELDING SHOPS*

WRITE for more information about portable Cup Wheels with "built-in guard" form A-1523.

SEND your request to The Carborundum Company, Dept. **F-81-02,** Niagara Falls, New York.

CARBORUNDUM

Circle 725 on Page 53

What's wrong with fresh air?

(Not a thing . . . especially in a foundry)

Yesterday's "impossible or fantastic" ideas are the commonplace items of tomorrow! Constant research, improvement and successful development of new ventilation ideas to keep ahead of advancing technology have become our trademark. We are proud of our record of service, project engineering, and the ALUM-ALUNG, IRON LUNG and TURBULO equipment so well received by industry. You can be sure that new ideas and improved methods are incorporated by IRON LUNG VENTILATOR COMPANY whenever it's possible to serve you better. Progressive development is one of our important basic policies along with dependability, reliable ventilation engineering service, and fair prices for the finest quality.

IRON LUNG ROOF VENTILATOR

Won't you stop at BOOTH 1334, Exhibition Hall, Philadelphia, May 9-13, so that we can become better acquainted? We would like to study your particular ventilation problem so that an engineered recommendation can be offered to you. Naturally, there's no charge or obligation for this service.

Circle 726 on Page 53

IRON LUNG VENTILATOR CO.

5414 Prospect Ave., Cleveland 3, O.

time lost by supervisory and management personnel. These men must assist the injured employee, investigate the cause of an accident, arrange for someone else to take over, train a new employee, prepare reports, etc. In aggregate, the cost of these activities assumes definite importance.

First Aid—The cost of time spent by first aid attendants and staff when it is not covered by insurance also should be considered. This cost usually is covered in the budget under a separate overhead classification. Nevertheless, when an individual accident is appraised, the amount involved in that particular accident should be calculated.

Insurance Costs—Increases in the cost of insurance caused by past accidents in the shop must be taken into account. Rates of all such types of insurance are, of course, based on the number and severity of accidents. As these mount, insurance rates climb, and such expenditure is part of any accident cost figures.

Equipment Damage — The sixth item should be costs due to damage to equipment, tools, and materials. There should be space on every accident report for notation of such damage. They are a part of the costs of any given accident as much as any outright expenditure of money involved.

Production Losses — Next, we should appraise the costs due to interference with production, failure to fill orders on time, loss of bonuses, etc. Unless the accident is very serious, not all these factors may be involved. But if they are, they should be included.

Benefit Payments—The cost to the employer under welfare and benefit systems also belongs in the accounting of individual accident costs, particularly when an earnest effort is made to arrive at a true figure for purposes of planning accident prevention programs.

Lowered Productivity — To the last factor should be added the cost to the firm in continuing wages by the injured employee in full after his return since for a time he probably will be worth only part of his normal value at his job. Just as the firm loses by inability of a replacement to meet an injured worker's production standards, so also must it suffer a loss until the returned employee regains his full capacity. Even a fully recuperated man must readjust himself to the routine of his particular job. In some instances, he must relearn skills which require continued, day-in and day-out exercise to sustain full production ability.

Downtime Losses—Closely akin to the foregoing is the cost due to loss of profit on the injured employee's productivity and on idle machines. Profits are based on worker productivity and continued operation of machines. When either drops, so do the profits. When they are lost at a particular spot because of an accident, the amount involved belongs in the analysis of cost of that accident.

Decreased Efficiency — We also must add cost which occurs as a consequence of the excitement or weakened morale of employees in a particular department as a result of an accident. When an accident has occurred (no matter how

The revolutionary Bliss Pulsation Burner

produces temperatures never before achieved with oil or natural gas. Burning oil, it can reach a searing 3450°F. On 1000 BTU/cu. ft. natural gas, it develops 3320°F. Both these extremely high temperatures are close to the theoretical limits for these two fuels. Foundries, smelters, heat treaters and other metal processers have been quick to take advantage of the remarkable combustion efficiency of these new burners. To them, it has meant faster heating cycles, cleaner flue gases, and above all, fuel economy that cuts from 12% to 30% from their furnace overhead. Not to speak of reduced maintenance on refractory linings.

To learn how the Bliss Burner can increase the heat output in your plant while it's saving you money in fuel and furnace maintenance, write today for our Bulletin No. 60. It's yours for the asking.

BLISS
SINCE 1837

E. W. BLISS COMPANY
Canton, Ohio
BLISS is more than a name—it's a guarantee

Circle 727 on Page 53

Your castings carry your reputation...

it pays to find cracks before your customers do

No matter how carefully you control pouring, handling or other processing, cracks and other "invisible" defects are likely to appear in *some* of your castings. You owe it to yourself to find trouble makers as quickly, efficiently and economically as possible.

Not all cracks need rejection—or repair. But cracks in high stressed areas of parts are very serious. Extremely small cracks can cause early failure, if highly stressed!

First, finding all such defects early eliminates bad castings before they go to your buyer or before time is wasted in your own machining or assembly operations.

Second, even *more* important—a defective casting carries with it your reputation and your best chance for repeat business. Can you afford to wait for your customers to test your product for you—especially when you can identify any important defects so easily and economically with Magnaflux Test Systems?

Third, reliable quality is your own best protection against possible conversion from your castings to other means of fabrication. Consistent quality is "job insurance."

Magnaflux testing for magnetic metals and Zyglo for nonmagnetics are easy to use, positive and can save far more than they cost. The critical flaws you need to find appear directly on the part—actually glow with Magnaglo or Zyglo.

Magnaflux-Magnaglo and Zyglo fit into your operations at any point...wherever and whenever this will save you the most money to find and correct the cause of the defects. Many foundries now install Magnaflux or Zyglo "check-points" along their processing set-up to insure the quality and profits of their output—start to finish. For gray iron tests, the $195.00 type Y-5 yoke kit proves extremely useful.

Regardless of the size or kind of castings you make, from ounces to tons, a Magnaflux Nondestructive Testing Engineer can help you meet your planned requirements—for quality, cost—even market expansion. Ask to have him call soon...meanwhile write for data and case studies.

With Magnaglo and black light, any cracks will show up as glowing indications. This casting was proved defect-free.

MAGNAFLUX-MAGNAGLO
For magnetic metals. Prices from $195.

ZYGLO
for nonferrous metals, stainless. Complete kits from $125.

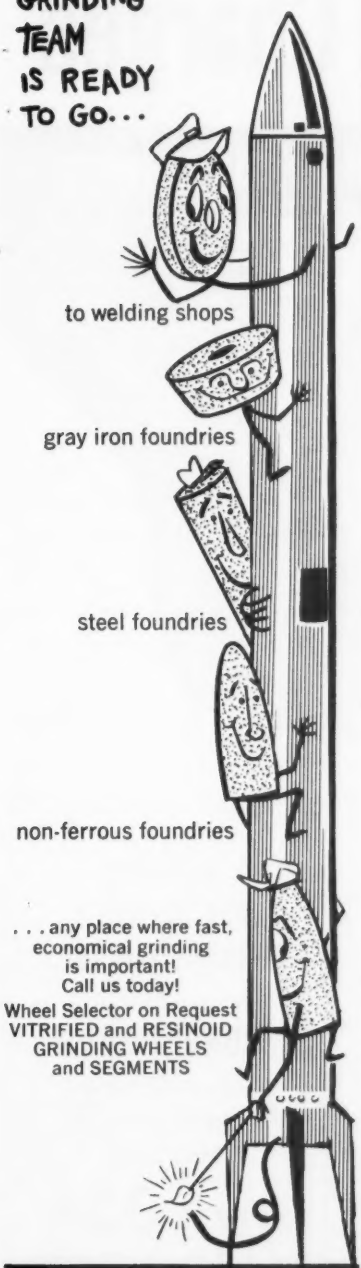
STRESSCOAT
Shows where and how stresses occur, during design or pilot stage.

Y-5 YOKE KIT
Portable, lightweight magnetic particle testing. Complete kit only $195.

MAGNAFLUX CORPORATION
A Subsidiary of General Mills
7350 W. Lawrence Avenue, Chicago 31, Illinois
New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 35 • Los Angeles 22

The Hallmark of Quality in nondestructive test systems

THE FM PORTABLE GRINDING TEAM IS READY TO GO...



. . . any place where fast, economical grinding is important! Call us today!

Wheel Selector on Request
VITRIFIED and RESINOID GRINDING WHEELS and SEGMENTS

THE FULLER MERRIAM CO.
WATER STREET
WEST HAVEN, CONNECTICUT
TELEPHONE WEST 3-2501

Circle 729 on Page 53

small), there is a drop in morale and efficiency. It may be overcome before the day ends, but usually persists for two or three days. The net result invariably is a drop of production efficiency in the whole department until the impact of the accident has worn off.

Overhead—Finally, the overhead cost per injured employee, insofar as general overhead is concerned, should be appraised and added to the total. This figure involves the expense of light, heat, rent, and other continuing items.

Some of the foregoing may seem inconsequential and unimportant. Considered as a sole cost factor involved in a given accident, each of these factors may be minor. But when all 12 are added together, the final figure is one which can not be brushed off lightly.

Book Review

Epoxy Resins, Market Survey and Users' Reference, **prepared by Harvard Business School Graduate Students, paper, 225 pages, 8½ x 10⅝ in., available from Materials Research, Box 363, Cambridge 39, Mass. Price $18.50.**

In the preparation of this report, the authors interviewed seven producers of basic resin, 20 of the largest formulators, and over 100 of the major users of epoxy resins. In addition, requests for information were made to more than 1000 other companies using these resins.

Following an introduction which describes epoxy resins and their uses, information is presented on the producing industry. A users' reference presents the results of the study as it pertains to a number of important industries, including the cast metals field.

The survey shows that, for a number of reasons, the use of epoxy resins has been slow, frequently because first attempts to use the material were not successful. It is pointed out that foundrymen must realize that new techniques are needed to use them.

Tables give information on expected life of epoxy foundry tools, compare costs of foundry tools made from metal and from epoxy tooling compound, and describe equipment and materials needed to make foundry tools. Case histories cite savings in use of epoxy patterns and coreboxes.

It is no longer necessary for you to buy and use general purpose metal abrasives on the basis of claims made by its manufacturers of its performance in other plants.

Now you can have "Malleabrasive" shot or grit formulated to fit the needs of your own particular product, cleaning equipment and operating conditions.

The flexibility of our process of making "Malleabrasive"—and it's ours *exclusively* . . . new techniques and specialized equipment new to the metal abrasive industry enable us to make the type of "Malleabrasive" that will do your cleaning job best.

If you are interested in pinpointing maximum cleaning efficiency and lowest blast-cleaning costs in your own plant, "Malleabrasive"—*tailor made for you*—will do both. Write for full information.

THE GLOBE STEEL ABRASIVE CO.
Mansfield, Ohio

Sold by many leading distributors of foundry supplies from coast to coast.

Circle 730 on Page 53

MALLEABRASIVE

Foundrymen–

Pre-Alloyed Furnace Charges

at a cost less than the price of their original components!

Quality Controlled Stainless and Nickel-Cobalt Alloys in Briquettes, Cut Plates, Stampings and other forms

• These Pre-Alloyed Furnace Charges from Security Alloys, pioneer processors of alloyed nickel, will help reduce your melting time because of their high density and uniform analysis. Tailor-made to most commercial and military specifications, requiring fewer foundry additives and permitting easier prediction of casting analysis.

Color-coded and packaged to your requirements at no extra cost.

For more information on how our Pre-Alloyed Furnace Charges can save you time and money, Write to Foundry Division, Security Alloys Company, Inc., 3100 West 49th Place, Chicago 32, Illinois or phone PRospect 6-8500.

SEE OUR PRE-ALLOYED FURNACE CHARGES *at the* **FOUNDRY SHOW**
Convention Hall
Philadelphia, Pa.
May 9-13

BOOTH NO. 324
Will be happy to answer any and all questions

SECURITY ALLOYS CO. INC.

FOUNDRY DIVISION

Circle 731 on Page 53

Russian Investment Casting

By NICHOLAS J. GRANT
Professor, Department of Metallurgy
Massachusetts Institute of Technology
Cambridge, Mass.

● INDUSTRIAL centers in Russia are separated by long distances with generally poor transportation facilities connecting them. Consequently, the centers must have a large measure of self-sufficiency in obtaining raw materials, producing component parts, and establishing manufacturing practices and facilities for the needs of that particular industrial center.

In addition, Russia is deficient in small parts manufacture, primarily because of a poorly developed automotive industry, an even more poorly developed home appliance industry, and in general, a poor consumer goods industry. Therefore, large, diversified diecasting, stamping, or small cast parts industries practically do not exist.

As a result, Russia utilizes more broadly the industries she has to get the most out of them. Castings are used more extensively in Russia than in Europe or the United States because of lower capital costs for equipment and shorter time of construction involved in setting up a foundry in contrast to a forging shop. Foundries in general are better equipped to handle complex small volume orders.

Russian literature and other evidence indicate that fewer, but on the average considerably larger, investment casting foundries are maintained, the size of the foundry depending on the size of the area being serviced, and the extent to which industrialization commands the resources of that area. Also, these foundries handle a broader range of castings than do foundries in the United States.

The following observations are based on Russian literature, discussions, and observations of a number of investment casting exhibits.

Shell Investment Process — The USSR makes castings as large as 12 x 16 x 32 in., and weighing up to 100 or more pounds, although most castings are smaller than this, but not as small as those generally produced in the U.S.A.

Of interest are castings for the aviation, trucking, instrumentation, heavy transport, and light and heavy machinery industries. Specific items include blades, vanes, and buckets for aircraft engines; tractor, automotive, motorcycle, and bicycle parts; gun parts; machine parts for the clothing, shoe, and textile incomputer and instrumentation industry. Extensive production facilities for the turbine, compressor, and marine industries also are of interest.

TABLE I — Dimensional Correction in Per Cent for Dies or Models

Casting Alloy	Silica Sand Molds	Fused Quartz Molds
Cast iron	0.5 to 1.5	1.5 to 2.5
Tin bronze	0.7 to 1.5	1.7 to 2.5
Special bronze	1.3 to 2.5	2.3 to 3.5
Brass	1.0 to 2.2	2.0 to 3.2
Plain carbon steels	1.0 to 2.5	2.0 to 3.5
High-manganese steels	about 3	about 4

Investment castings in Russia are based predominantly on a ceramic shell type of mold prepared and handled as described below. Wax is the preferred material for patterns although a variety of disposable pattern materials is available.

Simple Shell—The process involves building up a ceramic investment dip or spray shell around a wax pattern, melting out the wax, firing the shell, and placing it in a flask with loosely packed sand to maintain the shell in an upright position. The shell, after firing, almost always is cast in the cold condition. Some casting also is done into a totally unsupported shell.

Shell Plus Flask—A ceramic shell investment mold is made as described above. The shell is fixed in a flask which contains a bottom, packed with a dry sand mixture, and sealed off at the top with cement. This permits the entire flask assembly to be handled and transported. The flask assembly is placed in a furnace and brought up to temperature prior to casting. This is a supported shell, and provides for hot mold casting.

Shell Plus Investment—A shell investment mold with wax pattern in place is set into a flask and a liquid investment poured around the shell to serve as a firm back-up material. The disposable pattern is melted out and the entire assembly brought up to temperature prior to casting.

This procedure follows most nearly that commonly used in the flask investment process in the United States and in Europe. The only

TABLE II—Disposable Pattern Material Compositions

Composition Designation	Paraffin	Stearate	Ethyl-cellulose	Resin	Poly-styrene	Ceresin Wax	Di-butyl-phthalate*	Poly-ethylene
PC50-50	50	50	..	..	..	..	..	..
PC30-70	30	70	..	..	..	..	..	..
PC70-30	70	30	..	..	..	..	..	..
PCEh70-25-5	70	26	4	..	..	..	..	..
CEh87-;3	..	87	13	..	..	..	..	..
KPcCH50-30-20	..	..	..	50	30	20	0-5	..
PPEh90-10	90	..	..	..	..	..	..	10

*This material is a plasticizer and may be added in the weight percentage indicated to obtain desired plasticity in the pattern material.

TABLE III—Ceramic Materials and Their Cost*

Ceramic	Rubles/Ton	Dollars/Ton at 10:1	Dollars/Ton at 4:1	Cents/Pound at 10:1	Cents/Pound at 4:1
Silica sand	10-20	2.00	5.00	0.1	.25
Natural quartz (Marshallite)	50-100	10.00	25.00	0.5	1.25
Chamotte	150-200	20.00	50.00	1.0	2.5
Cristobalite	400	40.00	100.00	2.0	5.0
Fused quartz	500	50.00	125.00	2.5	6.25
Titania	9000	900.00	2250.00	45.0	112.0

*Official exchange is 4 rubles per dollar, but tourist exchange, more realistic, is 10 to 1.

ER-6
Heavy-Duty Compressors

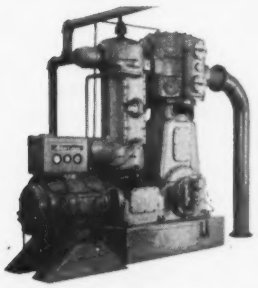
New! Fundamental improvements over conventional, typical heavy-duty compressors provide these three big advantages: (1) Only 18.3 hp required per 100 cfm at 100 psi, full load—10 to 15% lower than most compressors of this size! (2) Completely enclosed functional design protects external lines and fittings. (3) Extremely small space and simple concrete block required for permanent fixing—save on floor space, material and labor!

Plus—capacities to 1,140 cfm; standard instruments and safety devices; built-in reliability and long life for which Atlas Copco has been famous for more than 50 years!

Atlas Copco Atlas Copco Atlas Copco

Which... ATLAS COPCO COMPRESSOR

meets your needs best?



AR Heavy-Duty Compressors

More air per horsepower than any comparable compressor! For continuous, full-load operation. "L" angle, 2-stage, double acting. Water cooled. Standard models provide 382 to 3210 cfm free-air delivery at 100 psi; only 76-590 hp required! (Can be supplied for other working pressures on request.)

What's your compressor requirement? Need an installation large enough to provide air for all your needs? Or would a small, compact unit for auxiliary operation solve your immediate problem? Either way—and for a wide range of applications between these extremes—Atlas Copco has the compressor for you!

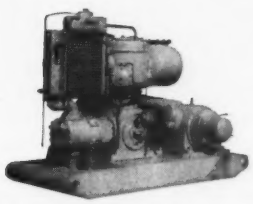
No matter which you choose, you'll get these proven advantages from Atlas Copco:

(1) More air per horsepower—less power consumption than other comparable units!

(2) Really low maintenance (one example — $3.10 after 10,000 hours' operation)!

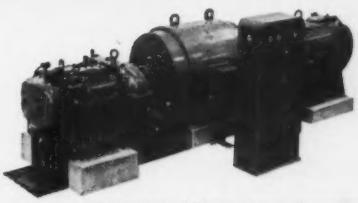
(3) Specifications are guaranteed free-air delivery — you get exactly what you order!

Get all the facts now—and compare! The coupon below will bring you a free catalog. (No obligation, of course.)



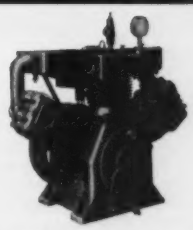
AR-L Heavy-Duty Compressors

Same basic construction as the AR Series, but provided with an air-cooled intercooler and air-cooled radiator for the cylinder water. Fan on compressor flywheel cools radiators. Perfect for arid areas or where difficult to bring in water. Both stationary and skid-mounted models available.



TWIN-AIR Rotary Screw Compressors

Brand new! "Twin-Air" Compressors offer capacities from 6,900 to 19,400 cfm at working pressures up to 115 psi. And, you get completely *oil-free* delivery of air or gas, since no lubrication is required — timing gears maintain small clearances between precision-mounted rotors, eliminating friction (and the necessity of oil) in compression chamber.



CT Air-Cooled Compressors

Stationary, or skid-mounted compressors for use where air demand is between 50 and 300 cfm. Totally air-cooled. Cylinder arrangement designed for smooth, vibration-free operation. Compact, rugged—for continuous, 24-hour trouble-free service. Highly efficient; low on maintenance costs.

FREE!

Write today for your free copy of our short-form catalog, describing the line of Atlas Copco stationary compressors. Ask, too, for detailed information on the model you need most. Use the handy coupon at right.

ATLAS COPCO
Dept. FO-4, 545 Fifth Avenue,
New York 17, N.Y.

Gentlemen:
Please send me ☐ Short-form catalog ☐ Detailed information on the _____ Series

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

Atlas Copco

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

Circle 732 on Page 53

difference is that instead of forming a thin, fine-grained coating on the pattern, a thick shell is built up before the pattern is invested with refractory slurry in a flask. In this instance, also, metal is poured into a hot mold.

Pattern Dies — Manufacture of disposable pattern injection dies best illustrates the breadth of application of investment casting in one form or another in Russia. Commonly used dies include: 1. Machined dies of high accuracy. Steel is preferred, with brass a second choice and aluminum a poor third choice. 2. Low-melting-point metal dies. 3. Combinations of 1 and 2. 4. Dies made by electroforming and metallizing procedures. 5. Rubber dies prepared by vulcanizing processes. 6. Gypsum and cement dies. 7. Gelatinous material and clay dies. 8. Wooden dies.

Seven grades of surface finish and an equally large number of dimensional tolerance specifications must be maintained for each type of die. The casting requirements are covered by a large number of specifications calling for many different qualities and types of castings.

Table I shows typical dimensional correction factors to be applied to master models or dies employed in making patterns for casting the listed alloys in two kinds of mold material.

Russians prefer machined steel dies when superior surface finish or close dimensional tolerances are demanded. Steel dies also are used for mass and intermediate production and for simple shapes. Generally, the die steel is a medium-carbon grade except that higher carbon alloys are used if the dies are long or of thin section size or if there is danger of bending.

Brass is the second choice and aluminum the third. It is pointed out, however, that aluminum does not permit superior surfaces or close dimensional tolerances. It is used primarily where weight saving is important in the handling of large dies, and where casting specifications are not rigorous.

The low-melting-point alloy cast dies are considered to be of secondary merit. For such dies, the master model almost always is steel. Generally, two low-melting-point alloys are used to make a die. The higher-melting-point alloy of the two is cast against the pattern and backed up with the other. Dies seldom are used in the as-cast condition but almost always are compressed against the master model to obtain better finish and dimensions.

Soft metal die alloys listed in the literature as examples do not include the approximately 50 per cent bismuth alloys which show much smaller shrinkage values on solidification and cooling than do other low melting point metals. Babbitt type metals are mentioned to be of interest, but are not listed as standard compositions for diemaking. Alloy compositions which have been listed include 87 Pb—13 Sb, 80 Pb—12 Sb—8 Sn, 3 Cu—4 Al—remainder Zn, and 9 to 13 Si—remainder Al.

There is great interest, although not necessarily great use, in electroforming procedures, metal spraying techniques, vulcanizing processes for rubber dies, and other diemaking methods. It is evident that pattern

POWERING

with Curtis compressors

DEPENDABILITY

DICTATES USE IN VITAL APPLICATION

New facility acts as high-speed communications headquarters for metropolitan fire and disaster control.

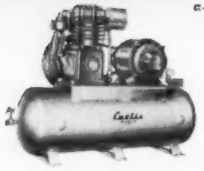
Architects: Hellmuth, Obata & Kassabaum

Consulting Engineer: John O. Falvey

NEW FIRE ALARM CENTER IN ST. LOUIS SELECTS CURTIS EQUIPMENT "TO RING THE BELL"

C-110

Curtis air compressors were selected for two different jobs in this just-completed "nerve center." By pressurizing cables that contain 1,172 miles of underground telephone and telegraph circuits, communications are protected against water or other damage. Another Curtis compressor powers eight cleaning jets located at key points inside the Center.



Full line of compressors available 1/4 to 50 H.P.

Your applications different? Probably—but the rugged dependability of Curtis compressors is the point that applies to **your** operations, too. All tanks meet ASME specification: units have Curtis-Seal Crankcase, Adjustable Timken Tapered Roller Main Bearings, Self Centro-Ring Oiling, Air Cooling (no cooling water required). Write for Free Catalogs covering the complete Curtis line.

THE COMPLETE LINE OF HORIZONTAL AND VERTICAL COMPRESSORS • AIR CYLINDERS • PENDANT AIR HOISTS

Curtis MANUFACTURING COMPANY

PNEUMATIC DIVISION • *DEPT. 42, ST. LOUIS 33, Mo.* • *Established in 1854*

With new RIS-A-SLEEVS by Johns-Manville . . .

riser metal stays molten . . . precious minutes longer!

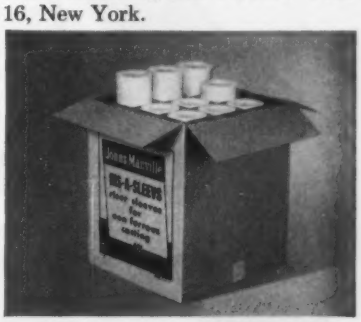
Now—for aluminum, brass and bronze casting—a new riser sleeve that contains heat more effectively than any product of its kind!

Here's the kind of riser sleeve you've long hoped would come along!

Developed by Johns-Manville research scientists, RIS-A-SLEEV reduces heat transfer as effectively as an advanced industrial insulation. With heat more effectively contained within the sleeve, you have precious minutes longer to feed small remote areas, and greater assurance that the riser metal will be very last to freeze.

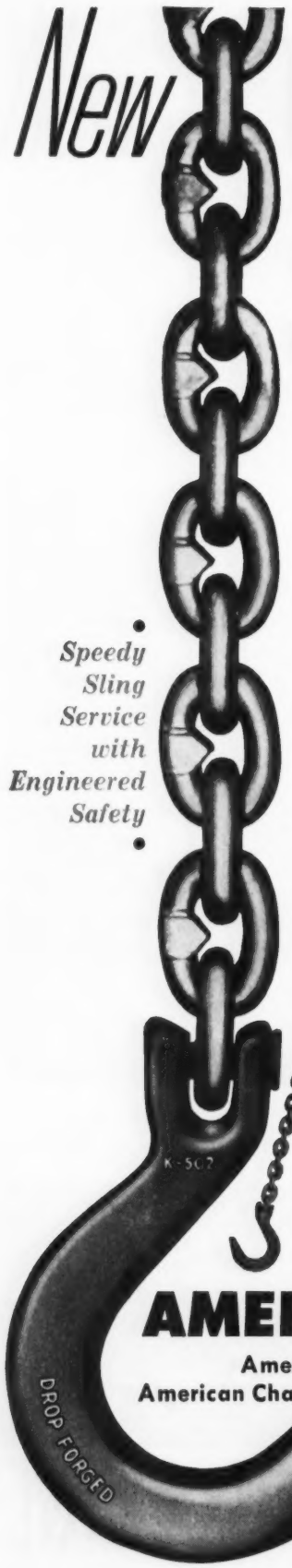
Because RIS-A-SLEEV insulates better, it lets you cut down still further on riser sizes . . . gives you closer control of solidification . . . results in sounder castings and fewer rejects.

And, of course, RIS-A-SLEEV will not contaminate sand. It's ideal, too, for blind risers. Available in complete range of sizes . . . at surprisingly little cost. We invite you to test RIS-A-SLEEV. We'll be pleased to send you samples along with complete information. Write today to Johns-Manville, Box 14, New York 16, New York.



JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS



New **KUPLEX**

Sling Chain Assemblies WITH Foundry Hooks

Made for trunnions and other foundry uses

• Chain sling assemblies that are "tailor-made" to your own foundry requirements are as near to you as your telephone!

Your nearby Kuplex distributor can furnish you with Kuplex sling chain assemblies made with drop-forged alloy steel foundry hooks in 6 sizes: ¼" to ⅞". Kuplex foundry hooks are engineered to be as strong as the chain itself—as are all the components which go into a Kuplex sling chain assembly. Kuplex foundry hooks are forged into a round at the point for easy insertion into casting holes.

Find out about the many advantages of ACCOLOY Kuplex Sling Chains from your authorized Kuplex distributor. Assembled locally of matched and engineered components, each part in a Kuplex sling assembly is designed and engineered specifically for use with all other parts. Each part is made from heat-treated ACCOLOY steel and proof-tested at twice working-load limits.

Kuplex Sling Chains made of ACCOLOY 125 chain are available in six sizes (¼" to ⅞") in single, 2-leg, 3-leg and 4-leg styles.

Speedy Sling Service with Engineered Safety

ACCO Foundry Hooks can also be furnished on ACCO Registered SLING CHAINS

Write our York, Pa., office for the name of the Authorized Kuplex Sling Chain Distributor nearest to you

AMERICAN CHAIN

American Chain Division
American Chain & Cable Company, Inc.
Bridgeport, Conn.
Factories: *York and Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

ACCO

dies of a wide quality range are used and that the resulting castings are not necessarily intended to be "precision castings." Rough shapes of greater detail and complexity than can be produced in sand foundries find extensive application. Precast forms for pressing and forging operations also appear to be a major production item. In this regard, we in this country may have overlooked a number of important applications, although our noncaptive investment foundries do not lend themselves as readily to such diversification.

Disposable Patterns — Table II lists typical disposable pattern materials which probably are indicative rather than definitive. Care is taken to use low-ash ingredients in the pattern compositions.

The purpose of the di-butylphthalate is to increase the plasticity of some of the compositons. In the top several compositions, it is possible to try other combinations of the ingredients to obtain a harder mixture, a lower melting mixture, or one better wetted by the ceramic slurry.

In general, cored wax patterns are used extensively not only for easier heating and melt-out, but also to decrease wax costs and minimize wax cave-in on solidification of heavier sections.

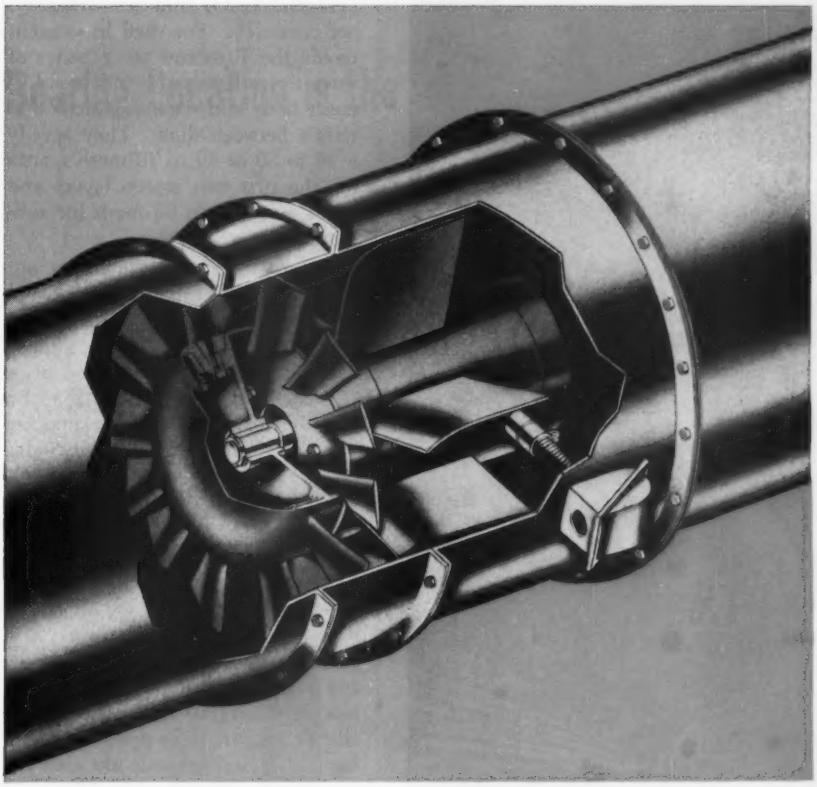
While the benefits of plastic disposable patterns are fully known, it is possible that the large and elaborate presses which are needed for plastic injection are not readily available for the investment casting industry.

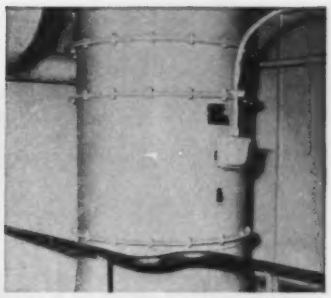
Water soluble waxes are well known and are utilized to a certain degree. The Russian trade name in this instance is "Carbamide." It has a melting temperature of about 129 to 134° C and an ash content of less than 0.05 per cent. The product is claimed to be highly fluid, inexpensive (in Russia, 2 rubles per kilogram), and nonreactive. Weldability is poor and moisture pickup from the atmosphere in storage leads to brittleness. A small addition of boric acid is claimed to decrease the brittleness.

Mold Materials—Table III lists the cost of ceramics most commonly utilized for investment shell and flask molds.

The most common ceramic is a

Circle 735 on Page 53





Joy Axivane Fans bolt right into the ductwork. This saves space and simplifies installation.

Joy Design Means:

COMPACTNESS AND SIMPLIFIED INSTALLATION

Joy Axivane® Fans are compact and easy to install because of the integral motor design. They can be bolted right into the duct, and will maintain the straight-through flow of the air. By eliminating the offsets and elbows necessary with other fans, Joy Axivane Fans improve over-all system efficiency. Installation costs are reduced, because the fans can be put in place as the duct is being fabricated, and there are no motor supports to construct.

The basic vaneaxial design of Joy fans makes them highly efficient, particularly where large volumes or high pressures are involved. All Joy Axivane Fans have adjustable blades. By changing blade pitch, fan output can be varied as much as $\pm 20\%$ without the loss of fan efficiency typical of dampers or variable inlet vane controls. When the system is difficult to calculate, or varies from time to time, this feature can save you a great deal of time and money.

For complete information on how Joy Axivane Fans can solve your ventilating problems, write for Bulletin 1213-13.

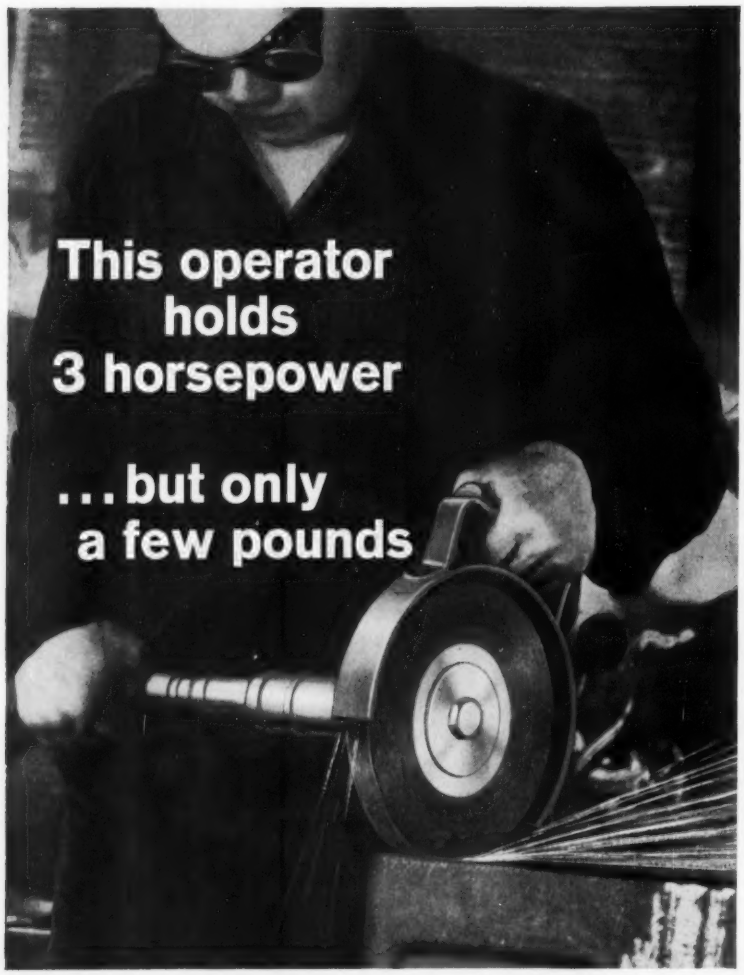
AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 736 on Page 53



Remington flexible shaft machines give an operator the flexibility of a hand tool plus the power for heavy-duty finishing operations in a convenient unit that weighs just a few pounds. Remington machines are ¾, 1½, or 3 hp and they're available in dust- and vaporproof or ventilated, industrial-duty motors.

Power is transmitted to the work by heavy-duty, Remington-made flexible shafts of high-carbon steel wound solid to the center. Shaft housing has exclusive, shiplap wound metal liner protected by steel armor and a tough grease-proof vinyl cover.

A variety of spindles and accessories adapt units for grinding, polishing, buffing, sanding, wire brushing or filing. Machines are single or multiple speed, and speed of the tool can be changed by using spindles of different speed ratios. Remington flexible shaft machines are made to exceptional standards of quality for service under severest conditions with minimum maintenance. Ask your distributor to show you the Remington line.

FREE FLEXIBLE SHAFT MACHINE GUIDE. 8-page booklet describes Remington flexible shaft machines plus motors, shafts and accessories available. No obligation—mail coupon today.

Remington

Remington Arms Company, Inc., Bridgeport 2, Conn.
IN CANADA: Remington Arms of Canada Limited
36 Queen Elizabeth Blvd., Toronto 18, Ontario

DUPONT

FREE POWER TOOL CATALOGS

Remington Arms Company, Inc., Bridgeport 2, Connecticut F-5

Please send free information on Remington Flexible Shaft Machines and Remington Contractor & Industrial Equipment I have checked below:

☐ Air Tools ☐ Concrete Vibrators ☐ Chain Saws ☐ Stud Drivers

*Name*_____ *Position*_____

*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

natural quartz called Marshallite and is specified to contain more than 97 per cent silica with less than 0.75 per cent Fe_2O_3 and less than 2.0 per cent clay. For shell investment molds the Russians use a series of three to ten layers of −200 to +270 mesh flour with coarser stucco materials between dips. They specify a 30 to 50 or 40 to 70 mesh quartz for the first two stucco layers and 20 to 40 or 30 to 50 mesh for subsequent stucco layers.

Chamotte is used sometimes but it is relatively expensive compared with silica sand or Marshallite. Fused quartz is recognized as a highly versatile material, but the price of this material is considered to be too high, even though it appears low according to the United States costs. The titania is white or a yellow translucent material, and is not described in further detail. Titania has been used mostly for high-manganese (10 to 30 per cent) steels which apparently are reactive even against MgO molds.

Common binders used for making shells are ethyl silicate, silica sols, or waterglass derivatives. Ethyl silicate appears to be preferred. Also, bentonites and cements are used for making shells when a coarser casting surface finish can be tolerated.

Summary—It is evident that the Russians utilize their investment casting activities much more broadly than is the practice in the United States or in other Western nations.

Production of castings ranges from those with ultra high finish and precise dimensions to those with only a fair surface and nominal dimensional tolerances, but which may be sufficiently intricate in design or shape that an investment casting, disposable pattern technique is warranted. In such instances, it would not be unusual to find crude patterns used with cement-bonded ceramic molding material.

The investment casting process frequently is employed to produce preformed shapes which subsequently are finished in regular forging operations. It is known that the Russians have made turbine blades and buckets by this technique.

From an examination of the extensive use of specifications for materials throughout the investment casting industry, it is evident that the over-all procedure is quite uni-

Bearing Location is the Key to Long Service Life

JOY LIMBEROLLER® CONVEYOR IDLERS

Joy Limberoller Conveyor Idlers give many times the normal service life, because the two bearings rest in slots in the support brackets—well away from spillage. On conveyor lines carrying sand, crushed rock, and other abrasive materials, Limberollers have given more than ten times the service life of steel idlers.

Limberoller Idlers consist of a neoprene coated wire rope to which are moulded neoprene discs. The ends of the rope turn in sealed bearings. This design not only eliminates clogging and freezing of the bearings, but also makes the idlers easy to service—they can be replaced while the belt is moving.

Limberollers are economical, not only because of long service life, but also because they can be spaced further apart than steel idlers. They are corrosion and flame resistant, self-cleaning, and eliminate the "bump" typical of steel idlers.

For complete details, write for Bulletin 325-13.

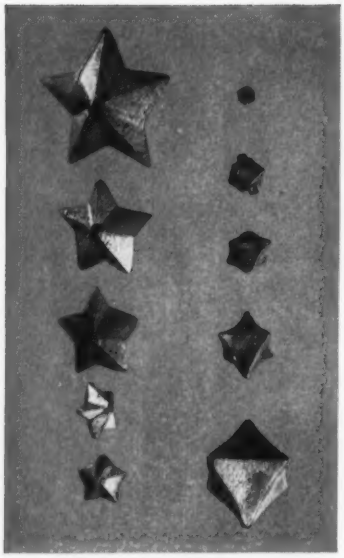
AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 738 on Page 53



Foundrymen have discovered
once they try

ABMET CLEANING STARS

they won't use anything else . . . not even their own!

For more than thirty large American foundries, Abmet cleaning stars mean substantial savings in cleaning costs. Abmet's abrasive-resistant qualities are many times higher than ordinary chilled or hard iron cleaning stars, and Abmet's Brinell hardness of 440 from surface to core assures sharp cleaning edges, longer life, more uniform cleaning ability and greatly reduced milling time. Replacements become much less frequent. That's why more foundries are giving up casting their own cleaning stars.

If you are wasting costly time, effort and material casting stars, you can save up to 500 percent in cleaning star costs by switching to Abmet.

Once you have cleaned castings with Abmet stars YOU WON'T USE ANYTHING ELSE!

For price list, sizes and styles, WRITE:

AGRICULTURAL ABMET BEARING METAL

QUINCY FOUNDRY, INC.
QUINCY, OHIO

Circle 739 on Page 53

form from one location to another throughout Russia, and that the industry has progressed to the point where standards of all sorts can be instituted for various types of castings, alloys, and applications.

The extremely extensive use of the investment shell process indicates that this has been worked out in great detail, to the extent that it has displaced the normal flask investment mold still preferred in this country, but which gradually is being replaced by shell techniques

Examination of sample Russian castings indicates that the quality is not outstanding. However, it is dangerous to generalize on the basis of the relatively small number of castings and assemblies which have been examined.

In the United States, because of high competition among stamping, diecasting, powder metallurgy, and other processes, investment casting faces exacting demands in terms of surface finish, dimensional tolerances, and mechanical, physical, and chemical properties.

Editor's Note: This article is from a paper presented at the 7th annual meeting of the Investment Casting Institute at Chicago, Nov. 3-4. The tables and much of the information are from *Precision Casting with Disposable Patterns*, by I. E. Shub and P. V. Sorokin, published in Moscow, Russia, 1958.

Plans Summer Symposium on Solidification of Metals

A one-week course is planned by Massachusetts Institute of Technology to bring knowledge in fields related to solidification into focus for the designer and cast metals engineer. Theoretical lectures, to be held from August 22 to 26, will lead to practical examples of how the properties of castings and forgings can be enhanced by improved control over the solidification pattern of the casting or ingot.

Topics covered will include mechanism of solidification, heat transfer in metal and refractory molds, segregation and microporosity in ferrous and nonferrous metals, vacuum melting, thermodynamics of metals, techniques for producing premium quality aluminum, magnesium, and steel castings, and others.

For further information write the Office of the Summer Session, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge 39, Mass.

POUR EASIER, POUR FASTER, MORE POURS PER LADLE

with **SPINCRAFT LADLES**

Light, rugged, Spincraft ladles save replacement costs, make every pouring job easier! Available in a vast range of sizes, in stainless steel as well as mild.

•

LIGHT IN WEIGHT LESS FATIGUE!

•

NON-SPILL SHAPE NO WASTE!

•

EQUIPOISED HANDLE BALANCED!

Write Today for Complete Data and Prices.

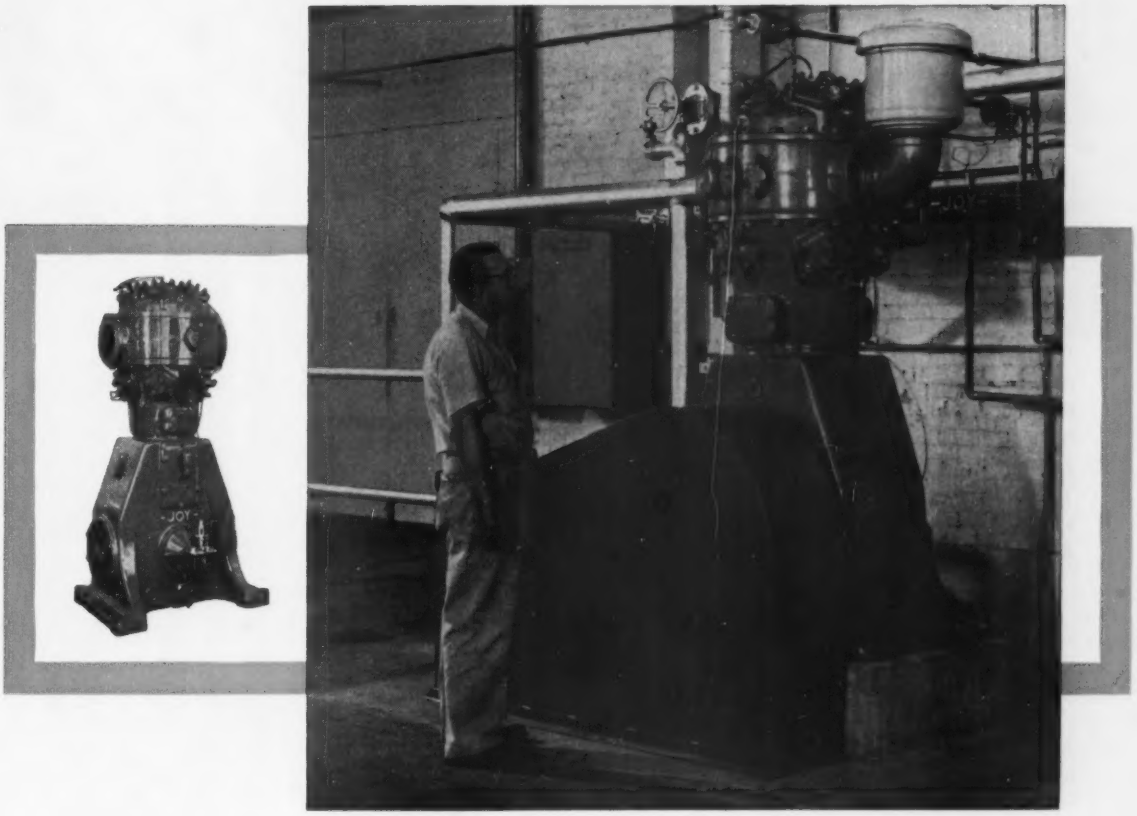
Spincraft
SKILL WILL DO IT

Division 2-0730
4124 WEST STATE STREET
MILWAUKEE 8, WISCONSIN

Circle 740 on Page 53

Now Available Up To 150 HP

NEW JOY WG9H VERTICAL COMPRESSORS



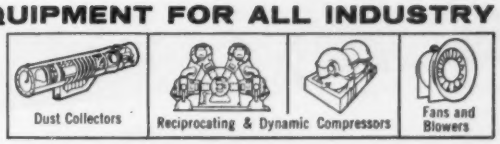
Joy's line of highly efficient vertical type compressors has been extended to 150 hp. These new heavy duty WG9H's have the same design features which established the vertical type, single-cylinder compressor's reputation for high efficiency and low maintenance.

You can get both standard and oil-free machines in six standard atmospheric air sizes, with appropriate cylinders for gas boosting and high pressure applications, if desired. Capacity range is from 633 to 1630 cfm.

Other Joy vertical type compressors are available in a range from 15 to 75 hp. Joy also can furnish V-type and semi-radial type machines up to 1250 hp, and axial or centrifugal compressors from 15 to 15,000 hp. Whatever your air or gas compressing problems may be, Joy can supply an economical solution.

For full information on the new line of WG9H Compressors, write for Bulletin 1013-13.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 741 on Page 53

Thor

Everything you want in Air Hoists . . .

and more!

Put a 30 lb. air hoist to work for you which lifts over sixty times its own weight. Easily handled by one man. Infinitely variable speed control from dead slow to 50 ft. per minute lift, 96 ft. per minute descent (1000 lb. model). Pendent or pull-cord control. Hook or trolley mounting. Roller or link chain. Automatic disc brake. 500, 1000, 2000 lb. capacities. Other models to 3 ton capacity. Your Thor factory representative or distributor will demonstrate in your own plant. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

Men of Industry

ELMER A. BLASDELL
Reliance Steel pres.

DR. RICHARD A. FLINN
. . . NFFS technical consultant

BERNARD C. YEARLEY
. . . becomes research v. p.

JAMES S. VANICK
. . . retires, Inco

Elmer A. Blasdell has been elected president, Reliance Steel Castings Co., Pittsburgh, succeeding **Charles L. Snowdon Jr.**, who has retired after 16 years as chief executive. **Donald W. Ebbert**, general counsel, has become vice president, secretary and a director. **R. E. Walters**, controller, has been made a director. Mr. Blasdell has been vice president of operations since 1946.

Russell C. Taylor has been named Pacific regional manager, with headquarters in San Francisco, for American Air Filter Co., Louisville, Ky., succeeding **Richard H. Nelson**, who will continue as a director of the company. **Charles J. Bressoud**, since 1954 sales engineer in the Los Angeles office, has taken over Mr. Taylor's former duties as branch office manager there.

Roger H. Haberman and **Eugene H. Schilz** have been appointed assistant sales managers, and **Roy W. Bellin**, district sales manager, Grede Foundries Inc., Milwaukee.

Neal J. Kemp has been made manager of the enlarged Chicago branch, Materials Handling Div., Yale & Towne Mfg. Co., Philadelphia, succeeding **Arthur H. Dobler**, who has been made executive officer of the division for the Middle West in Chicago. Mr. Kemp was manager of lift truck and tractor shovel sales in Detroit.

Dr. Richard A. Flinn, professor of metallurgical engineering in charge of the Cast Metals Laboratory, University of Michigan, has been named technical consultant by the Nonferrous Founders' Society, Chicago. He will work closely with the society's technical and marketing committees, and provide service to member firms on a per diem basis.

Bernard C. Yearley has been appointed vice president of the new General Research, Development and Engineering Div., National Malleable & Steel Castings Co., Cleveland. For five years Mr. Yearley has been assistant to the vice president. Previously he was assistant manager of the Chicago Works and director of research in Cleveland.

J. S. Stevens, assistant manager of sales, in Charlotte, N. C., has been made district manager of the Birmingham office, Air Reduction Sales Co., succeeding **J. M. Crockett**, who has been transferred to the New York home office. Mr. Stevens will continue as southeastern railroad zone manager for the company.

Henry C. Fechtmeyer has been named a vice president, Ampco Metal Inc., Milwaukee. He continues as secretary and controller. **J. P. Henry**, vice president-general manager, was named a director. **J. D. Zaiser** was re-elected president.

James S. Vanick, research metallurgist with the Development & Research Div., International Nickel Co., New York, has retired after 38 years of service. His work with the company has been chiefly with foundry products in iron and nonferrous alloys. Active in the Gray Iron Division of the American Foundrymen's Society, Mr. Vanick received the AFS William H. McFadden Gold Medal in 1956 for service to the ferrous castings industry.

William Bejari, Norwalk, Calif., has joined Arcair Co., as field representative in Bremerton, Wash. **Richard Henderson** has been appointed chief engineer, with headquarters in the Lancaster, Ohio, headquarters.

Allan S. White has been named Cleveland field engineer, Norton Co. He worked in the Cleveland office prior to training at Worcester, Mass., headquarters.

Curry E. Ford, new products marketing manager, National Carbon Co., Div. of Union Carbide Corp., New York, has been named director of marketing. He joined the company in 1937.

Jack A. Stevens, formerly Dayton, Ohio, sales representative, Roto-Finish Co., Kalamazoo, Mich., has been appointed eastern division

RUSSELL M. HELD
. . . Tamms general sales mgr.

JESS TOTH
. . . Dietert Co. v. p.

JOHN F. O'BRIEN
. . . Hysol California sales

RICHARD S. NEUFELD
. . . becomes sales v. p.

sales manager. **William J. Walther** continues as company sales manager. **James A. Harrison** has been named representative in New York and the New England area.

Russell M. Held, formerly vice president in charge of the Trade Sales Div., has been appointed vice president-general sales manager, Tamms Industries Co., Chicago.

Jess Toth has become vice president and secretary, Harry W. Dietert Co., Detroit. Mr. Toth attended Detroit Institute of Technology and joined the Dietert company in 1934. Since 1954 he has been secretary and sales manager. Mr. Toth also recently was elected executive secretary of the honorary board of directors for the Children's Memorial Hospital Foundation of Manila, Philippine Islands.

Dr. F. J. Shortsleeve, assistant research engineer, has been named director of research, Technology Dept., Union Carbide Metals Co., Div. of Union Carbide Corp., New York. **E. J. Boyle,** executive engineer, has been appointed director of development, and **Dr. E. Epremian,** senior research metallurgist, has become technical co-ordinator.

John F. O'Brien has joined Hysol of California, Div. of Hysol Corp., Olean, N. Y., as technical field salesman in the southern California area.

George W. Myers has become sales manager, Maynard Electric Steel Casting Co., Milwaukee. He was formerly with Consolidated Foundries & Mfg. Corp., Chicago, and was president of Crucible Steel Casting Co., Milwaukee.

Eugene M. Hinze, manager, Runge Foundry Cost Systems, Cleveland, has been appointed cost consultant for the Gray Iron Founders' Society. He succeeds **John L. Carter,** who has been named cost editor of the society's *Gray Iron News* and other publications. Mr. Hinze has been central states regional cost consultant for GIFS during the last 15 years.

Richard S. Neufeld, for the past year sales manager, U. S. Reduction Co., East Chicago, Ind., recently became vice president in charge of sales. He has been with the company since 1948. **Jerry I. Solomon,** director of purchases, has been made vice president in charge of purchasing.

Sheldon W. Hughes retired recently as foundry superintendent of the Hale Fire Pump Co., Conshohocken, Pa.

T. W. Krueger has been named vice president, Duff-Norton Co., Pittsburgh, and will continue as general sales manager. He joined the company in 1947 as advertising and sales promotion manager. **Richard G. Nolte,** vice president-general manager, has been made executive vice president. **Cleighton Hilbert,** formerly general manager

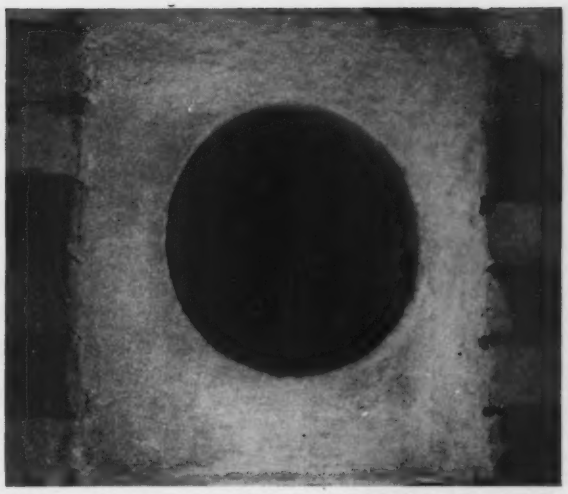
DR. F. J. SHORTSLEEVE

E. J. BOYLE
. . . Union Carbide Metals appointments

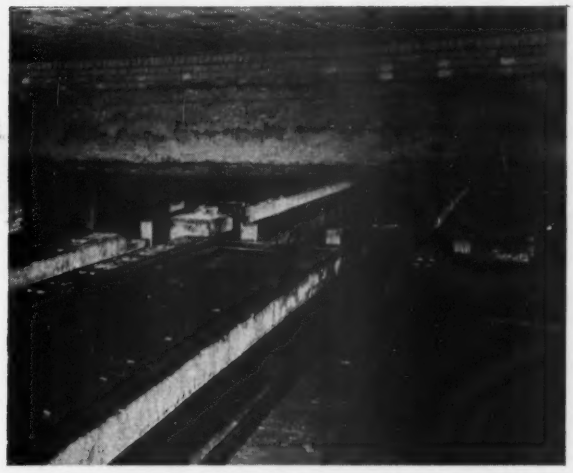
DR. E. EPREMIAN

T. W. KRUEGER
. . . Duff-Norton v. p.

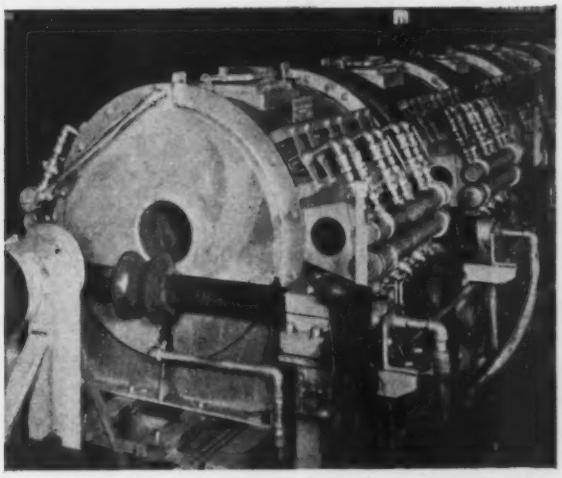
Electrode ports of this electric furnace roof are formed of B&W castable. B&W Kaocast or Kaocrete-32 can be successfully used, depending on severity of service.



High thermal release burner block is cast of B&W Kaocrete-32. Both Kaocrete-32 and Kaocast are used for burner blocks and other services in many other furnaces.



Nose arch of walking beam type furnace for heating forgings is made of Kaocast, B&W's 3000 degree castable. Kaocast is also used in forming complete forging furnaces,



This high speed barrel type heating furnace is typical of many which are completely lined with high temperature B&W Kaocast.

How B&W refractory castables solve high temperature problems

The higher temperatures in industrial processes have called for refractory castables that will stand up in these severe services. B&W offers two extremely durable, high temperature refractory products—Kaocrete-32 for applications up to 3200 F, and Kaocast with a 3000 F use limit. Both have high strength, unusual volume stability and excellent resistance to spalling and slag attack. Investigate B&W *specialized* refractory castables for solutions to your high temperature problems.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for copy to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N.Y.

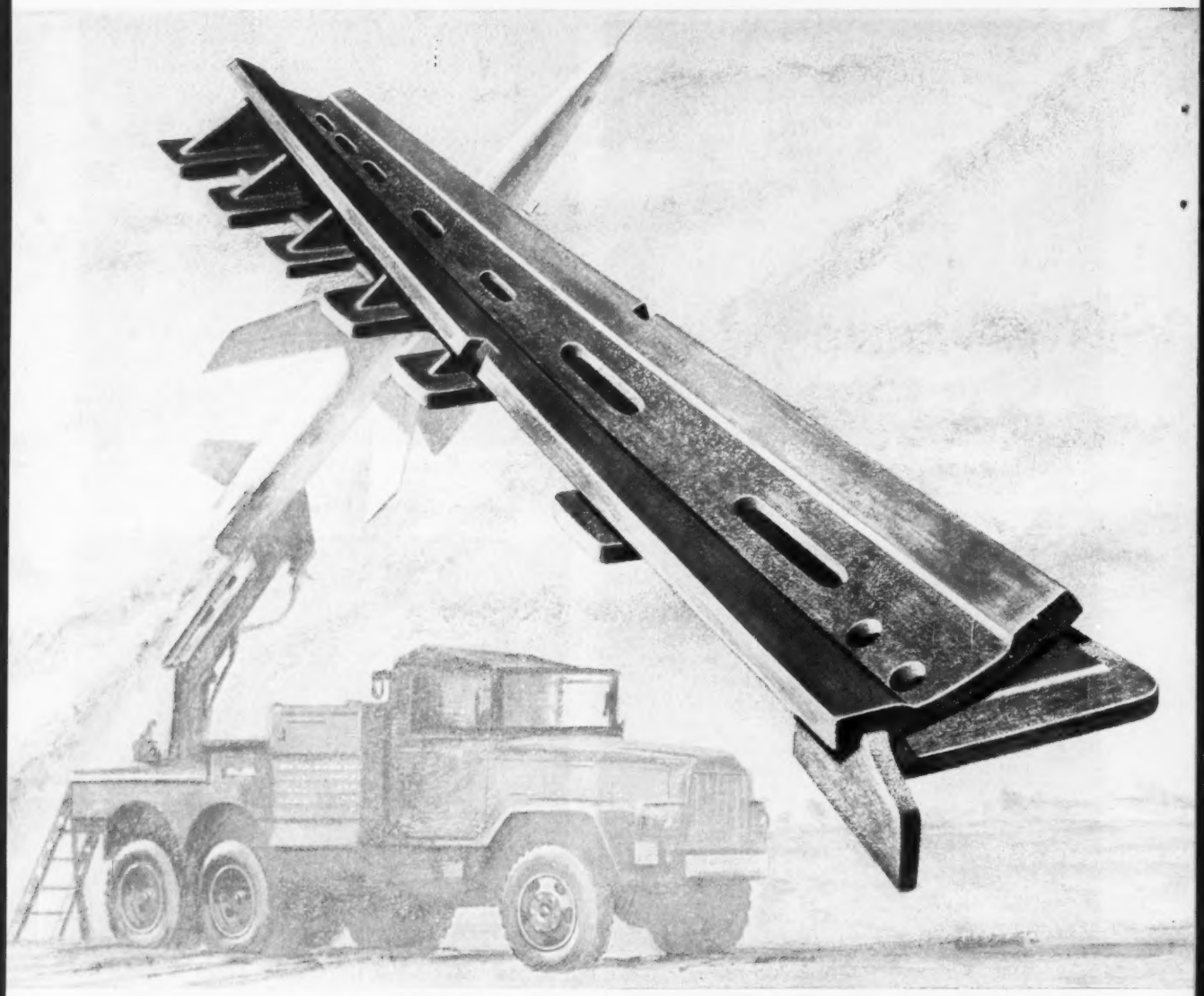
B6208

B&W THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

How the Foundry Industry serves America . . . one of a Series



IRON CASTING REDUCES COST OF MISSILE LAUNCHER TRACK BY 41%

This important contribution to the guided missile industry was accomplished by replacing the nine independent parts formerly used with one integral high-strength iron casting. Not only was a substantial saving effected, but the cast iron track with its much greater dimensional stability assured the exact alignment so vital to successful missile launching.

This is a typical example of the improved performance at lower cost that can be achieved by incorporating modern iron castings into sound, modern industrial design.

Hanna is proud to be part of this great industry and will continue to provide foundries with all regular grades of pig iron . . . foundry, malleable, Bessemer, intermediate low phosphorus, as well as HANNATITE® and Hanna Silvery . . . in the same high quality and to the same high standards that have made Hanna the best known name in iron.

Facts from files of Gray Iron Founders' Society, Inc.

HANNA
THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia

Hanna Furnace is a division of **NATIONAL STEEL CORPORATION**

Circle 744 on Page 53

PAUL W. OLSON

GEORGE R. FRYE

. . . Eaton Mfg. Co. division mgrs.

of the Coffing Hoist Div., in Danville, Ill., was named vice president of manufacturing. **Walter I. Floyd** is president.

Paul W. Olson has been appointed general manager of the Marion Forge Div., Eaton Mfg. Co., Marion, Ohio, succeeding **T. A. Moretti,** who has been transferred to special assignments. **George R. Frye,** since 1954 factory manager of the company's Foundry Div., in Vassar, Mich., has become general manager of that division, a position which Mr. Olson held for five years.

Willard C. Baker, George Luekens, and **Stanley Zansitis** have been appointed sales representatives, Cleveland Metal Abrasive Co., Cleveland. Mr. Luekens was formerly sales representative for Hickman, Williams & Co., Cleveland.

Henry J. Lang, formerly in the Philadelphia office of Acheson Colloids Co., has been named Michigan sales representative, with headquarters in Detroit. **Fred Zajac** has been named applications development engineer in the Port Huron, Mich., home office. He was Detroit representative.

Dr. Frederick J. Dunkerley, formerly assistant general manager, Rolle Aluminum Co., Philadelphia, has been made vice president in charge of production for all plants of Wellman Bronze & Aluminum Co., Cleveland.

Floyd L. Paschke has been named sales manager, Rotor Tool Co., Cleveland, subsidiary of Cooper-Bessemer Corp., Mt. Vernon, Ohio. He joined the tool company in 1941, and in 1956 became western application engineer in charge of midwestern and southwestern sales.

Fred S. Wellman, board chairman, **Holley G. Wellman,** vice president and secretary, and **Harry Allchin,** vice president, have retired from Wellman Bronze & Aluminum Co., Cleveland. They were hon-

HENRY J. LANG

. . . Acheson Colloids sales

FLOYD L. PASCHKE

. . . Rotor Tool sales mgr.

In the interest of the American foundry industry, this ad (see opposite page) will also appear in

Steel
Iron Age
Foundry
American Metal Market

FREE!

REPRINTS OF THIS AD WITH YOUR FIRM'S SIGNATURE

If you would like to have reprints of this ad to mail to your customers and prospects, let us know. Reprints will have no Hanna product message or signature, but will be imprinted with your firm name and address. Absolutely no obligation. To order your reprints, fill in and mail the coupon below.

The Hanna Furnace Corporation
Detroit 29, Michigan

Please send me_____ reprints of Ad No. _____ (No.)

____ of your Foundry Industry Series.

Imprint as follows:

_____

_____

_____

Send reprints to:

NAME _____

I understand there is no charge for this service.

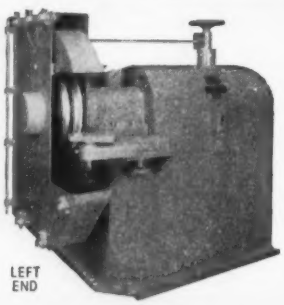
Circle 744 on Page 53

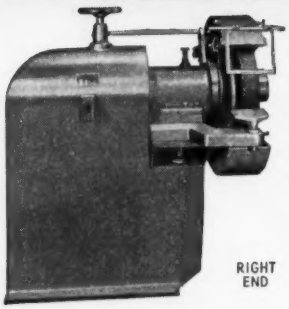
"Over 60 Years Service to Industry"

Challenging Comparison

AMERICA'S GREATEST AND MOST DIVERSIFIED LINE FOR ALL INDUSTRY

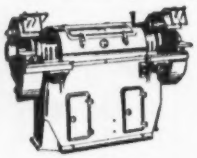
GRINDERS


LEFT END

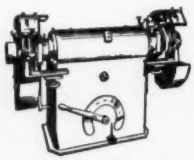

RIGHT END

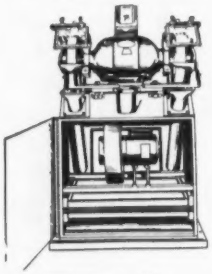
SINGLE END VARI-SPEED SNAGGING GRINDER 7½ to 40 HP MODEL 61VS

Ideal stub user. Constant peripheral speed regardless of wheel diameter for increased production and longer wheel life. For vitrified or high speed grinding wheels.


BELT DRIVE

DIRECT DRIVE

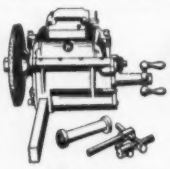

GEAR DRIVE


GRINDER with Built-in Dust Collector

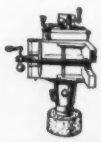
GRINDER-BUFFER

SWING FRAME

WRITE FOR CATALOGS


TOOL POST

PRECISION LATHE


VERTICAL SPINDLE

PORTABLE

The United States Electrical Tool Co.

3640 LLEWELLYN ST., CINCINNATI 23, OHIO

ored recently at a dinner on the 50th anniversary of the company's founding. The Wellmans have been with the company since it was founded. **Dan T. Wellman** will continue as president, and **C. Farrand Taplin Jr.** becomes secretary.

Wayne Hungate, recently with the St. Louis office, Hickman, Williams & Co., has been transferred to the company's Cleveland sales

WAYNE HUNGATE
. . . Hickman Williams sales

office to handle northeastern Ohio. He joined the company last year after two years with the Wheelabrator Corp., Mishawaka, Ind. Previously he was with Riverside Foundry, Bettendorf, Iowa, for 10 years.

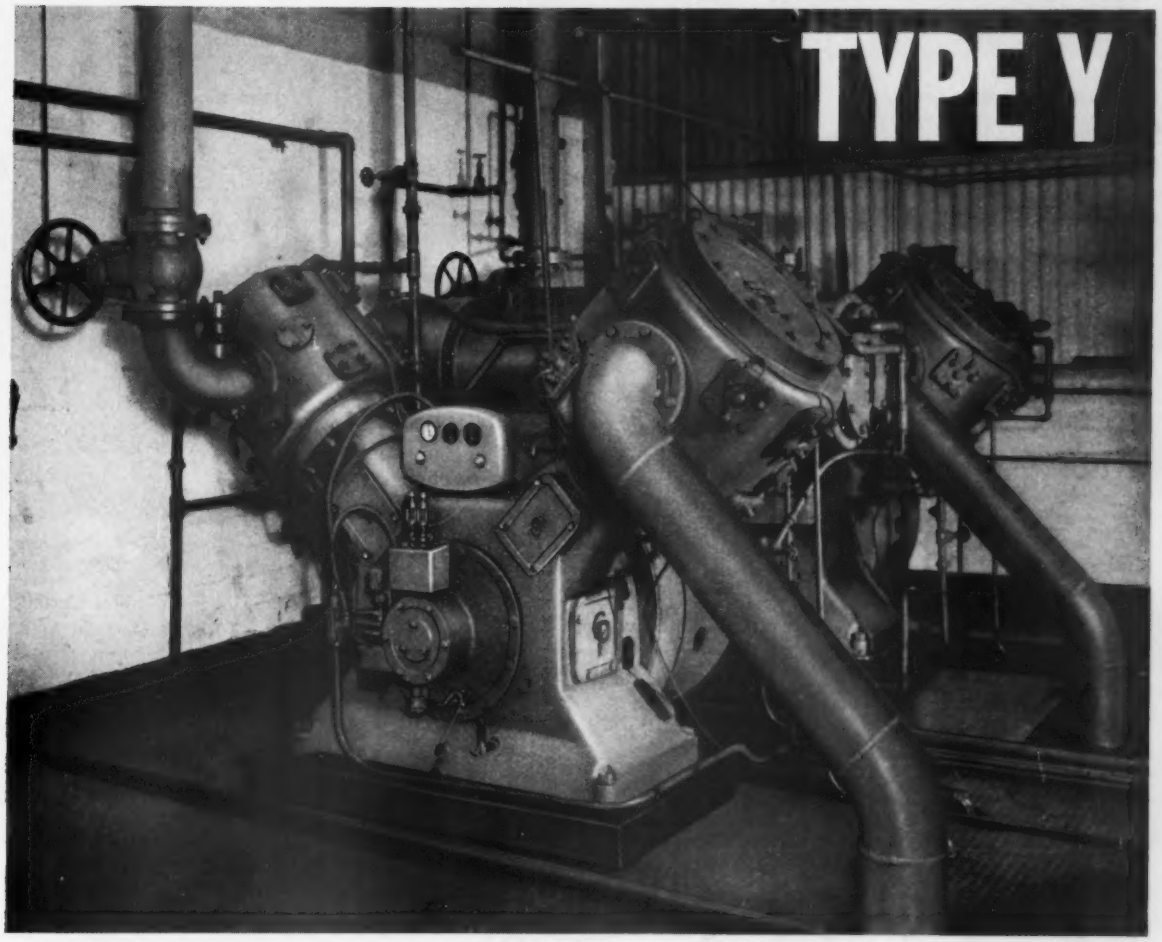
W. D. McMillan, supervisor of metallurgy, McCormick Works, International Harvester Co., Chicago, has retired after 37 years of service.

George F. Hodgson has been made director of research, Doehler-Jarvis Div., National Lead Co., New York. **Henry L. Byrne** has been named assistant to the division's chief engineer, and **Byron W. Koch** has become chief product development engineer.

R. W. Akerlow, manager of the special projects division, Stearns-Roger Mfg. Co., Denver, has been elected president of the Manufacturers Association of Colorado.

Robert E. Morris, St. Louis district manager, has been made midwest regional manager, Industries Group, Allis-Chalmers Mfg. Co., succeeding **C. F. O'Riordan,** who has been named north central regional manager. **M. M. York,**

PACKAGE COMPRESSORS SIMPLE • COMPACT EASY-TO-INSTALL



Suitable for a wide range of requirements, these well balanced, smooth-operating heavy-duty compressors are available in:

- Single and multi-stage designs
- 400 to 1400 c.f.m. at 100-125 psi, 75 to 250 hp
- Choice of flange-mounted motor, coupled or belt drives

Other CP compressor types available from 7½ to 5,000 hp and pressures up to 15,000 psig . . . all built to provide "around-the-clock" service with minimum attention.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

CM METEOR

ELECTRIC WIRE ROPE HOIST

- WITH POSITIVE TWO-SPEED CONTROL
- FOR HEAVY DUTY FOUNDRY SERVICE

With the CM Meteor, you have a choice of two precise speeds at your finger tip... regardless of the weight of the load... and regardless of the direction of travel--up or down. Just depress the (up or down) push button part way for slow, steady "creeping" speed... all the way for fast speed. It's as simple as that. And either speed can be held as long as desired. It's one of the reasons so many, many foundries favor the CM Meteor.

CAPACITIES 1/2 TO 5 TONS

- Designed for heavy duty service. Airplane type cooling. Thermal protection for motor.
- Compact, enclosed construction gives full protection under foundry operating conditions.
- Balanced design. Low headroom.
- Only 110 volts at push button control. Safety type hook blocks.
- Precision bearings. Helical gears.
- Long life with minimum maintenance.

METEOR Catalog covers construction ...suspension... operation details. Send for a copy and name of distributor.

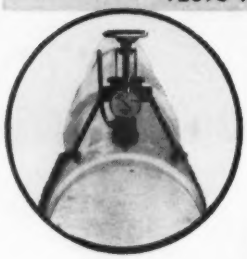
CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK

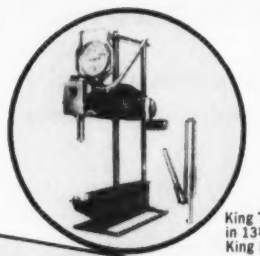
Regional Offices:
NEW YORK • CHICAGO • CLEVELAND
In Canada: McKinnon Columbus Chain Ltd., St. Catharines, Ont.

Circle 748 on Page 53

MAKE ALL BRINELL HARDNESS TESTS WITH The KING PORTABLE TESTER



King Test Head with Chain Adapter



King Test Head in 13½" base with King Brinell Scope

ONE TEST HEAD FITS MANY INEXPENSIVE ADAPTERS

King Test Head in 30" base

King Bore Brinell with small test head for pipes, cylinders, etc.

The KING PORTABLE HARDNESS TESTER

- To test any size, shape or thickness of metal.
- Makes guaranteed accurate on-the-spot tests — anywhere!
- Gap 10" — 13½" — 30". Throat 4" — 6¾" or larger with chain adapter.
- Loads from 62½ Kg. to full 3000 Kg. 5mm or 10mm steel or carbide ball.
- Will make tests in places no other tester can reach — including cylinder bores.

Write for literature and prices to Dept. F560

KING TESTER CORPORATION 440 N. 13th St., Phila. 23, Pa.
Known the world over for accuracy and dependability

Circle 749 on Page 53

who recently held the latter position, has been assigned to a new position in the Milwaukee home office. **William S. Wright,** sales representative in Grand Rapids, Mich., becomes manager there, replacing **J. A. Sudduth,** who has become St. Louis manager.

J. R. Johnstone, marketing manager of carbon products, National

J. R. JOHNSTONE
. . . *administrative assistant*

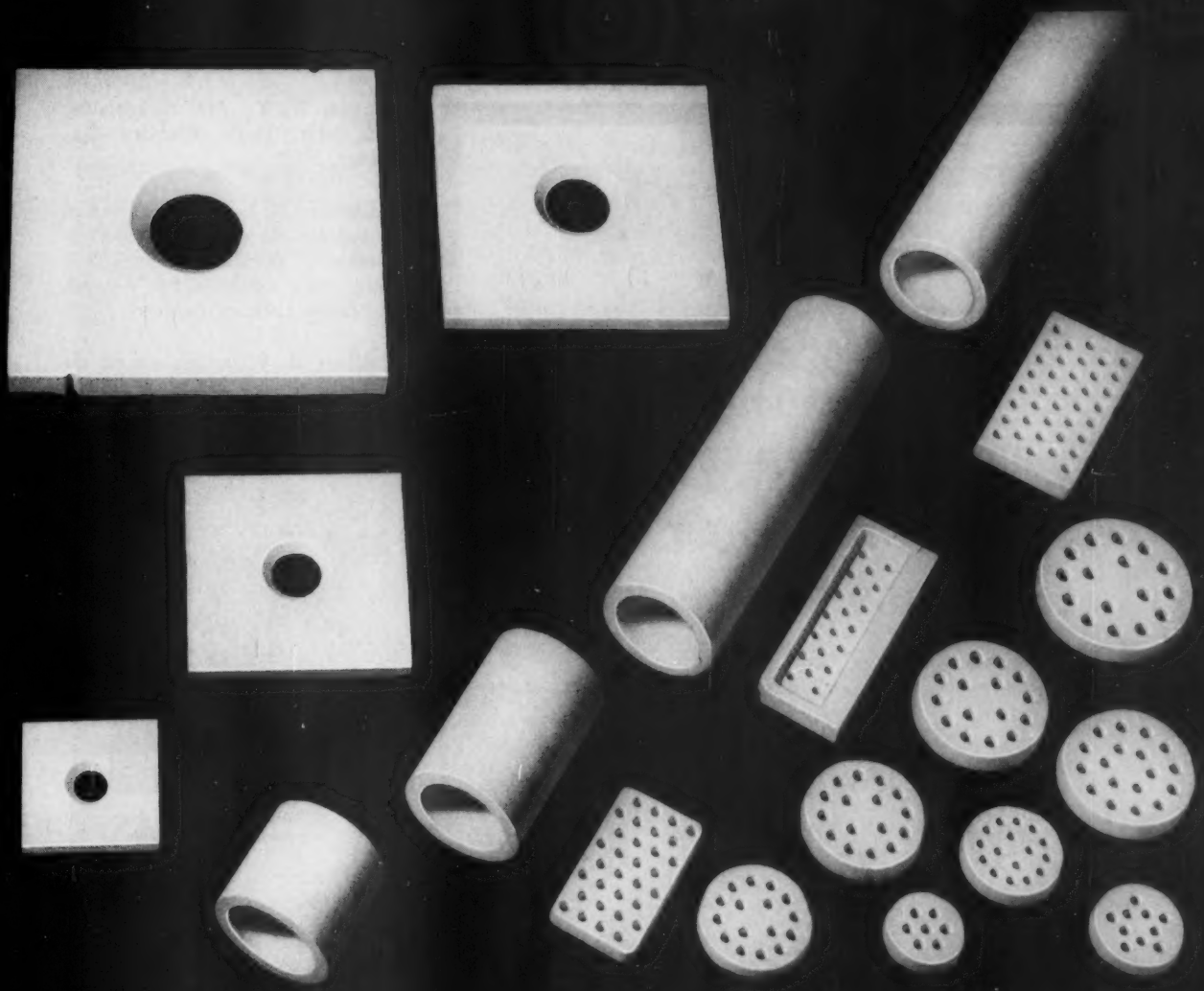
Carbon Co., Div. of Union Carbide Corp., New York, has been appointed administrative assistant to the president. He joined the company in 1937.

William F. Rhodes, formerly with Minnesota Mining & Mfg. Co., St.

WILLIAM F. RHODES
. . . *joins Bay State Abrasive*

Paul, has joined Bay State Abrasive Products Co., Westboro, Mass., as southeastern sales representative.

Richard F. Houghtaling has been appointed central territory sales representative for the Tonawanda Iron Div., American Standard, New York. He will operate from division headquarters in North Ton-



what users like best about

Louthan gating and risering refractories . . .

There's a good reason why Louthan is making more and more refractories for the foundry field. *Users like them,* like the way they perform on the job, like the cost reductions they make possible.

Louthan Strainer Cores are now available in more sizes and shapes—and for *steel, iron, brass* and *bronze* castings. All provide an accurate choke for positive control of metal flow, eliminate slag and oxide inclusions.

Louthan Breaker Cores facilitate rapid removal of the riser with subsequent labor savings. There is no core gas. You get cleaner castings. Available for all riser diameters from 2″ to 12″, and for use with *any metal casting* risering from a flat surface.

Louthan Gate Tiles prevent erosion of the gates in steel castings. They safely withstand high temperatures, will not react with the molten metal. All popular diameters and lengths can be furnished, also elbows and tees to match.

FREE: Write for this new Louthan product booklet. You'll find that our products match your needs and perform the way you like them to.

FERRO

FERRO CORPORATION

Refractories Division

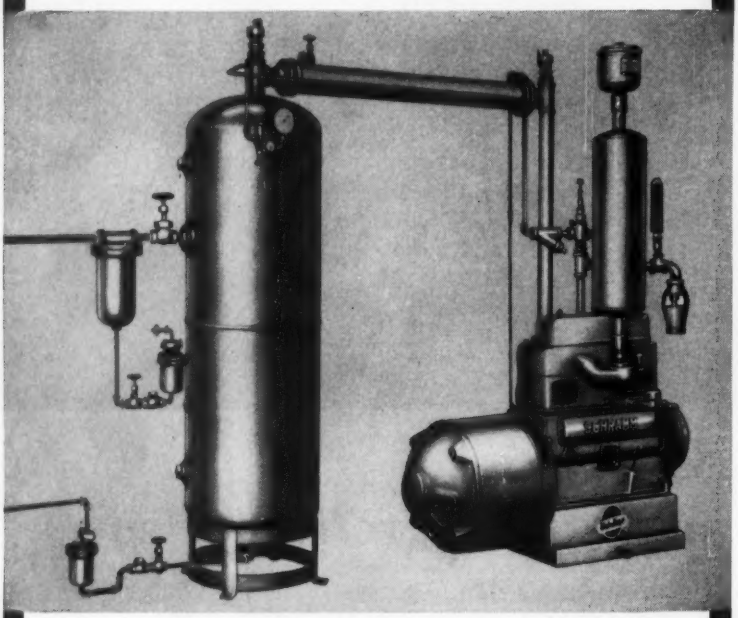
LOUTHAN PLANT . . . EAST LIVERPOOL, OHIO

Circle 750 on Page 53

REPRESENTATIVES: M. A. BELL COMPANY, St. Louis 2, Mo. . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 46, Wisc. . . **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . Indianapolis 7, Ind. . . Buffalo, N. Y.; **MISSOURI REFRACTORIES COMPANY,** 4599 Pacific Blvd., Los Angeles 58, California

Schramm

again chosen to supply compressed air for the 1960 Foundry Show



Here's why! Schramm Stationary Compressors are a complete package . . . compressor, aftercooler, air receiver all in one compact unit. They also take less space—and require no foundation since they are vibration-free. And Schramm Compressors are easy to move, easy to handle. Wouldn't these advantages also be valuable in your plant?

Be sure to see the Schramm Compressor at the Foundry Show, Booth Numbers 924-926. And write for copy of Catalog SSB 59.

Schramm AIR COMPRESSORS

650 North Garfield Ave., West Chester, Pa.

awanda, N. Y. Mr. Houghtaling was with Tioga Foundry Co., Owego, N. Y.

Kenneth Majors has been named manager of the customer service department, Standard Horse Nail Corp., New Brighton, Pa., succeeding **James Latham**, resigned.

Albert R. Wells has joined the sales department of Canton Malleable Iron Co., Canton, Ohio. He

ALBERT R. WELLS
. . . joins Canton Malleable

was formerly a sales engineer with the Aluminum Div., Dayton Malleable Iron Co., Dayton, Ohio.

Melville J. Patterson recently joined K. H. Huppert Co., Chicago, as sales manager. He will direct expansion of the engineering department. Mr. Patterson has been chief engineer and assistant to the general manager, Diversey Engineering Co., Huntsville, Ala.

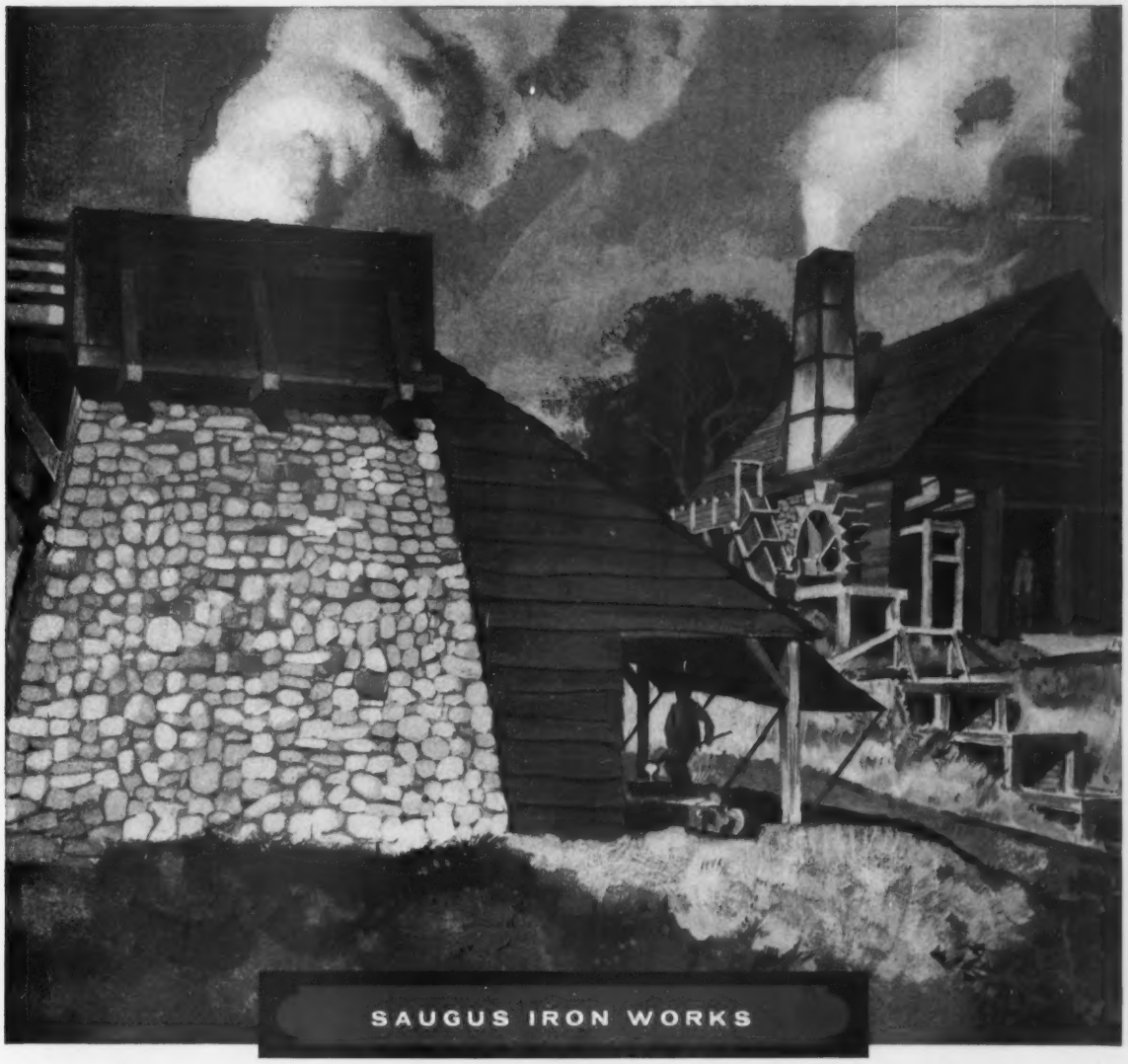
John Yosin, formerly at the Winfield Plant, Chrysler Corp., Detroit, has been named quality control manager at the company's foundry division in Indianapolis.

H. Earl Love, Philadelphia sales manager, has been made assistant sales manager of the eastern division, Pyrometer Co. of America Inc., Penndel, Pa. He has been with the company since it was formed in 1958.

Joseph Nixon plans to establish a consulting and sales engineering service, May 1, in Kenmore, N. Y. Services will include sale of castings for leading foundries, foundry supplies, and advice on materials and use. Mr. Nixon retired in 1958,

Circle 724 on Page 53

Gray Iron Foundry Milestones—No. 4



IN 1642 Thomas Dexter and Robert Bridges established the first American iron foundry on the Saugus River, near Lynn, Massachusetts. An earlier attempt to construct a foundry at Falling Creek, Virginia in 1622, fell victim to an Indian massacre.

With English sanction, the Saugus Iron Works was granted exclusive rights to make and sell iron for 21 years. It could freely mine ore, cut wood, dam streams and set up furnaces on tax free, donated public lands. Employees were exempt from military duty and could stay away from church, "without losing voting privileges."

This was the birthplace of the famous "Saugus Pot," the first casting made in America. This was the beginning of ferrous casting on this continent.

As a supplier of quality foundry coke and pig iron, Pittsburgh Coke & Chemical Company is proud to contribute to the continuing growth of the great Gray Iron Foundry Industry.

Reproductions of "Saugus Iron Works," suitable for framing, may be obtained without charge by writing to the Coke & Iron Division, Pittsburgh Coke & Chemical Company, Grant Building, Pittsburgh 19, Pennsylvania.

COKE & IRON DIVISION
PITTSBURGH
COKE & CHEMICAL CO.
GRANT BUILDING PITTSBURGH 19, PA.

Neville Pig Iron and Neville Coke for the Foundry Trade

FOR SHELL MOLDING THE LEADERS* SEEK

Low initial investment

Guaranteed top production

Guaranteed quality productian

Simplest operation

*

Allis Chalmers Manufacturing
American Brake Shoe Company
American Steel Foundries
Belle City Malleable
Bendix Aviation
Buick Foundry—Div. of the General Motors Corporation
Century Brass Foundry
Century Iron Foundry
Chicago Malleable
Cooper Alloy Corporation
East St. Louis Casting Company
Eaton Manufacturing Company
Evinrude Motors
Fahralloy Company
Ford Motor Co. of Canada
Forest City Foundries
Gale Manufacturing Company
G. H. R. Foundry
Grede Foundries Inc.
Green Foundry Company
Howard Foundry Inc.
Haynes Stellite Company
Kiekhaefer Aeromarine Motors
Lavelle Foundry
Lee Bros. Foundry
Link Belt Company
Lynchburg Foundry Company
Metal Parts Corporation
Midwest Alloys, Inc.
Owens-Corning Fiberglas Corporation
Paramount Hardware
Port Shell Molding Company
Rock Island Arsenal
Texas Foundries
Tonkawa Foundry
Wells Manufacturing Company
Woodruff & Edwards

HUTCHINSON

SHELL MOLD MACHINES OFFER THE FINEST SHELL MOLDING SYSTEMS AVAILABLE

Electrical, gas and pneumatic equipment to J. I. C. Standards.

HUTCHINSON SHELL MOLD CO.
4131 ALBY STREET, ALTON, ILLINOIS

after 27 years with Whitehead Metal Products Co., Buffalo, as foundry engineer. Previously he was with American Mond Nickel Co., Clearfield, Pa.

Walter A. St. Clair, for the last four years assistant sales manager,

WALTER A. ST. CLAIR
. . . division sales mgr.

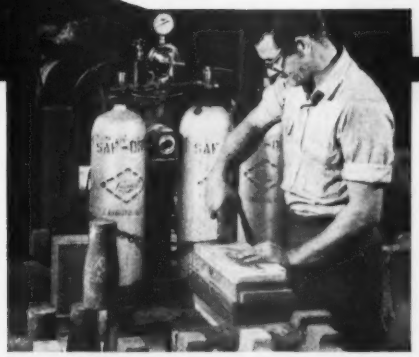
has been appointed sales manager, Industrial Truck Div., Hyster Co., Portland, Oreg. He joined the company in 1946.

Richard G. Whitlock, engineering service manager, has been appointed assistant sales manager, W. W.

RICHARD G. WHITLOCK
. . . assistant sales mgr., Sly

Sly Mfg. Co., Cleveland. He was previously with Babcock & Wilcox Co., New York.

Edgar F. Dunn has been appointed manager of Whitehead Metals Inc.'s Syracuse branch office, which has been expanded to include northeastern New York, and will operate as a main branch of the New York home office. **G. M. Miller** has been made assistant branch manager, and **C. F. Hannan,**



FOR CORES
Liquid Carbonic CO_2 core curing set-up in operation at Pacific Brass Foundry, San Francisco, California.

FOR MOLDS
Fast, bakeless hardening of molds for large castings —like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

See the advanced CO_2 process for curing cores and molds

Learn why foundry men the world over are so enthusiastic over amazingly fast bakeless core and mold curing. CO_2 curing is as easy as it is inexpensive. Liquid Carbonic's free folder gives complete instructions. Or, if you prefer, a trained "Liquid" representative will call on you and conduct a demonstration. Just mail the coupon.

LIQUID CARBONIC
DIVISION OF **GENERAL DYNAMICS**

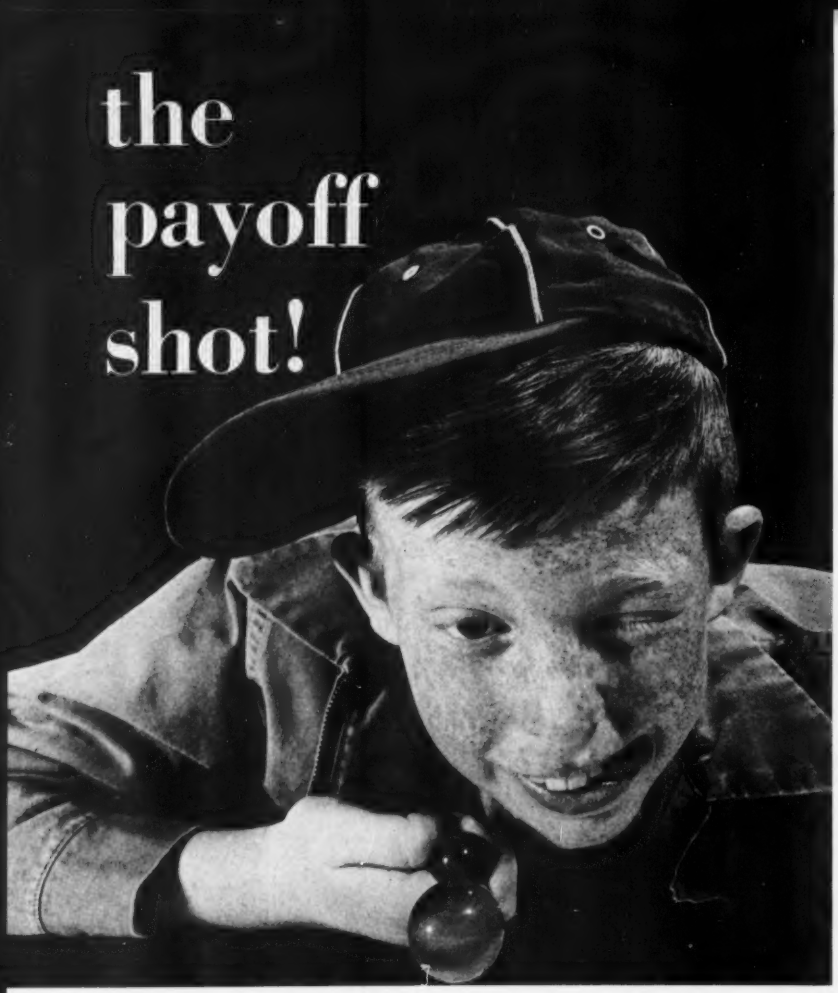
135 South LaSalle Street, Chicago 3, Illinois
In Canada: Liquid Carbonic Canadian Corporation, Ltd., Montreal 9, Quebec
The World's Largest Producer of CO_2

LIQUID CARBONIC, DIVISION OF GENERAL DYNAMICS
Dept. F, 135 South LaSalle Street • Chicago 3, Illinois

☐ Send me your free instruction booklet on CO_2 core curing.

☐ Have your representative call and give me demonstration of CO_2 core curing.

Name_____
Company_____
Address_____
City_____ Zone___ State_____



AMASTEEL SHOT pays off for New England foundry!

Concerned about the cost of blast-cleaning grey iron castings, a New England foundry* compared performance of the malleable iron shot they had been using, with AMASTEEL shot, and with cast steel shot from another manufacturer. Results of the 7 months of tests: Consumption of malleable varied between 93¢ and $1.59 per wheel hour; the cast steel shot averaged $1.08 per wheel hour, and AMASTEEL *averaged 88¢ per hour!* Record-keeping and housekeeping were meticulous: Wheels and blades were kept in top shape; machines were purged between runs. And the payoff in dollars and cents was AMASTEEL! Castings were cleaned faster (ready for painting!)—at lower cost! One of 5 great abrasives made by a company with 25 years' experience, AMASTEEL can do wonders in *your* cleaning department, too! Ask for details, Booth 1135, Foundry Show!

**Name and case history on request.*

AMASTEEL

BOOTH 1135

ALLOY METAL ABRASIVE COMPANY

121 SOUTH DIVISION STREET
ANN ARBOR, MICHIGAN

Circle 722 on Page 53

sales manager, in Syracuse. **R. W. Marriott** was named sales manager of the Buffalo branch. **W. V. Fitzgerald** succeeds Mr. Marriott as stainless steel product manager, and **J. E. Walsh** takes over Mr. Fitzgerald's former duties as sales manager in Windsor, Conn.

Jean-Pierre Polar has been named assistant to the director of technical information, Climax Molybdenum Co., New York, preparatory to later service with the company's Zurich,

JEAN-PIERRE POLAR
. . . technical assistant

Switzerland, operation. While at the Federal Institute of Technology in Berne, Switzerland, he conducted research for Climax on alloyed cast iron.

C. H. Cline, formerly foundry superintendent, H. G. Enderlein Co., Philadelphia, has joined the state of New Jersey's Department of Labor and Industry.

Charles Wieber, plant superintendent, has been named works manager, Sivyer Steel Casting Co., responsible for operations at Milwaukee and Chicago plants. He joined the company in 1925.

Austin D. Vanderbilt has been appointed manager of industrial engineering, Crouse-Hinds Co., Syracuse, N. Y., where he will co-ordinate work of the plant engineering, planning, standards, quality control, and safety departments.

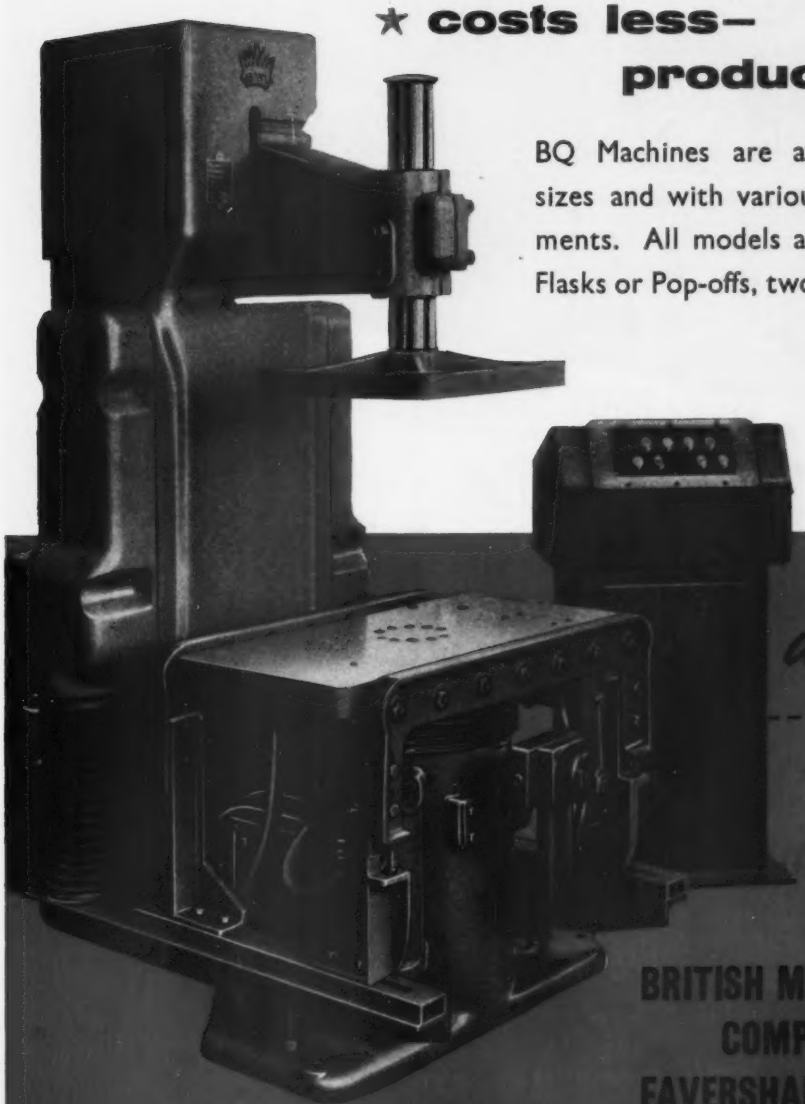
Dr. Richard W. Fountain has been named manager-metals research, Metals Research Laboratories, Union Carbide Metals Co., Div. of Union Carbide Corp., Niag-

BQ AUTOMATIC

★ **cycles in 8 secs**

★ **makes harder moulds**

★ **costs less—**
produces more



BQ Machines are available in different sizes and with various stripping arrangements. All models are suitable for Tight Flasks or Pop-offs, two at a time or singly.

Technical representation service and all spares Now available in USA & CANADA.

write today

for full particulars of these and other models

BRITISH MOULDING MACHINE COMPANY LIMITED
FAVERSHAM KENT ENGLAND

See us at Philadelphia—Booths 102, 104, 201, 204

Circle 759 on Page 53

You Are Cordially Invited to
Join Us at Our Suite...
during the...
AMERICAN FOUNDRYMEN'S SOCIETY
64th Casting Congress and Foundry Exposition
MAY 9th-13th, 1960 • Bellevue Stratford Hotel
ALLOYS & CHEMICALS CORPORATION
PRODUCER OF AC ALUMINUM ALLOYS
4365 BRADLEY ROAD • CLEVELAND 9, OHIO • ONtario 1-8600

ara Falls, N. Y. He has been technical supervisor in the Metals Research Group.

Eugene F. Scherr has been made midwestern manager, Western Precipitation Div., Los Angeles. For

EUGENE F. SCHERR
. . . becomes midwestern mgr.

15 years he has been in the Chicago office of the company, which recently became a division of Joy Mfg. Co., Pittsburgh.

Robert T. Pring has joined Dracco Div., Fuller Co., Cleveland, as manager of dust collector sales. For the last ten years he was technical

ROBERT T. PRING
. . . joins Dracco Div.

director of the Dust and Fume Div., Wheelabrator Corp., Mishawaka, Ind.

David D. Black has been named assistant sales manager for distributor relations, Cincinnati Milling Products Div., Cincinnati Milling Machine Co., Cincinnati.

Terrance P. Brennan, former football coach at Notre Dame University, has joined Miller & Co.,

STEP UP YOUR PRODUCTION OF SHELL CORES AND MOLDS WITH . . .

FASKURE

RESIN COATED SAND

REDUCE YOUR COSTS
• SAVE TIME
• CUT REJECTS
• IMPROVE QUALITY
FREE TECHNICAL SERVICE

WRITE FOR BULLETIN 101

CONTACT US DIRECT, OR THE FOUNDRY SUPPLY DEALER NEAREST YOU!

Foundry Supply Co., Minneapolis, Minn.
Brandt Equipment & Supply Co., Houston, Texas
St. Louis Coke & Foundry Supply Co., St. Louis, Mo.
Fischer Supply Co., Chattanooga, Tenn.
Fredric B. Stevens, Inc., Detroit, Buffalo, Cleveland, Chicago, Indianapolis, Milwaukee, New Haven, Springfield (Ohio)

FASKURE is a tested, proven product — a combination of our exclusive formulae and processing, backed by years of experience in our own and many other foundries.

QUALITY CONTROL — positive uniformity assured by testing all sand to meet specifications for melt point, tensile strength and rate of shell formation.

FOR MOST FOUNDRIES . . . FASKURE IS LESS EXPENSIVE THAN "MIXING YOUR OWN"— eliminates scrapped cores and castings caused by experimental coating. Saves on equipment costs, floor space and labor.

STANDARD MIXES AVAILABLE FROM WAREHOUSE STOCK — specials on request.

FASKURE COATED SAND DIVISION
AURORA METAL COMPANY
614 WEST PARK AVENUE • AURORA, ILLINOIS
PHONE TWinoaks 7-8419

SEE US AT BOOTH 919, FOUNDRY SHOW

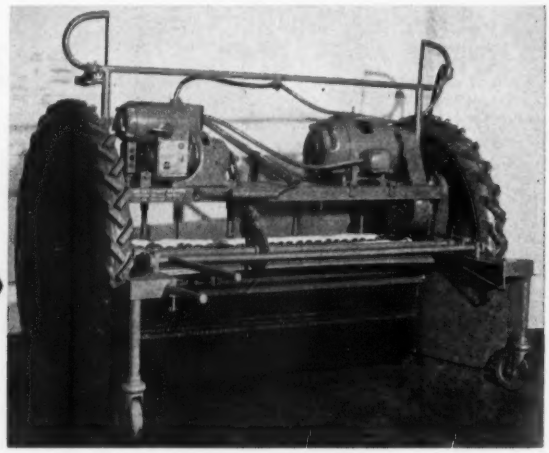
"The Moulders' Friend" .....

the one-man sand conditioner that conditions two tons of sand in one minute!

Yes, this machine does the work of several men—and far better and cheaper, too. The rotary wire brush thoroughly mixes and aerates the sand, and the machine travels everywhere under its own power. It mixes, wets and screens the sand so thoroughly and economically, no foundry can afford to be without one. Call or write for free information.

SEE "THE MOULDERS' FRIEND" IN OPERATION AT THE FOUNDRY SHOW

BOOTH 1542



"The Moulders' Friend"

Dallas City, Illinois

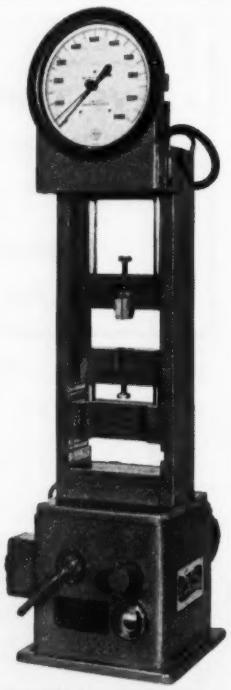
Circle 762 on Page 53

Tensile Testers

• Motorized • Bench-Mounted
• Easy-to-Operate • Low Cost
Capacities from 1,000 to 20,000 lbs.

Available in two general sizes that occupy minimum space and provide consistently accurate and dependable results. Simple, easy-to-use controls are conveniently located on front of base. Jaws are quickly changed to accommodate specimens of different sizes. Operation is hydraulic; powered by 1/6-hp. 110-v motor. Load gage is protected from specimen-fracture shock by rubber mount. Twin load gages and floor stand are available as optional equipment.

Write or call if you have any special testing problem

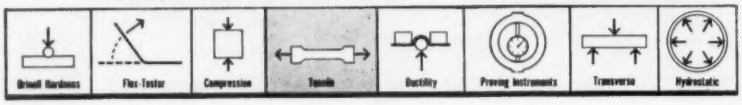


These machines are designed to also perform compression tests.

Steel City Testing Machines Inc.

8801 Lyndon Ave., Detroit 38, Mich.

Distributors in most major metalworking areas



Circle 763 on Page 53

Chicago, as special assistant to the vice presidents and staff-co-ordinator. For a year after leaving the university he was with the Chicago office of Goldman, Sachs & Co.

Ben Fles recently joined the Material Handling Div., Conco Engineering Works, Mendota, Ill., as sales manager. Since 1947 he has been with Manning, Maxwell & Moore Inc., Muskegon, Mich., recently as manager of the Special Contracts Div.

BEN FLES
. . . Conco division sales mgr.

Jerry McEvilly has been appointed Chicago area field representative, Arcair Co., Lancaster, Ohio, with headquarters in Milwaukee.

Fred Knisley, formerly vice president of the foundry, flooring and raw materials division, Tamms Industries Co., Chicago, has been elected vice president and treasurer. He joined Tamms in 1925.

Don Hott has been appointed western regional manager in Los Angeles for Hauck Mfg. Co., Brooklyn, N. Y., succeeding **Al Cunningham**, who has been made Philadelphia district manager.

J. Lloyd Hoff has been named president, and **Alfred A. Coley**, vice president, Inductotherm Linemelt Corp., Delanco, N. J., associate of Inductotherm Corp., there. The new company will make core-type induction melting equipment, developed by Mr. Hoff, and handle coreless low-frequency melting furnaces. Mr. Hoff was chief engineer, and Mr. Coley, assistant to the president, Ajax Engineering Corp., Trenton, N. J.

PERMABRASIVE®

how precise can *You* be in your blast cleaning room?

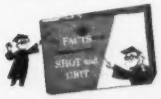
Blast cleaning is admittedly a job of many variables, hard to keep on an even keel. Involved in economical blast cleaning are such things as good housekeeping, good control over equipment and, of course, good shot and grit. Many blast cleaning troubles develop, because the characteristics of many abrasives vary with each shipment!

NATIONAL has developed its ability to give you abrasives with controlled characteristics ton after ton after ton. This eliminates the *one* variable over which you have no control and makes possible staggering savings. Cost-conscious customers have enjoyed this NATIONAL advantage for over a decade!

Exactly what is YOUR application? Are you using steel? **PERMABRASIVE®** can save money through faster cleaning and lower costs per ton. Are you using an ordinary annealed abrasive? **PERMABRASIVE®** can save money through faster cleaning, minimum graphitic carbon content, and longer life, because of a low phosphorus content. Are you using chilled? **CONTROLLED "T"®** can save money up to 50% on consumption and up to 40% on maintenance costs, because of its controlled BHN: an iron fist (for the product to be cleaned) in a velvet glove (to be kind to blast cleaning machinery). Have you a tough, individual problem? NATIONAL'S metallurgists KNOW what it takes to reach an objective and KNOW how to produce a custom-made abrasive for a specific job!

We're not just talking to hear our own voices. Everything can be proven to you in your own plant under your own conditions as it has in thousands of other cases—without an operation-disturbing test. Try us!

See us at the **FOUNDRY SHOW.** BOOTH #528



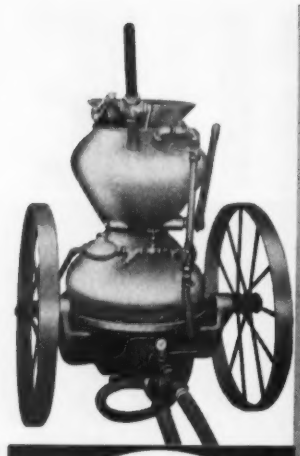
SEND FOR YOUR FREE COPY:

The Facts of Life concerning the use of Shot and Grit

Sold Exclusively by
HICKMAN, WILLIAMS & COMPANY (Inc.)
Chicago · Detroit · Cincinnati · St. Louis · New York · Cleveland · Philadelphia · Pittsburgh · Indianapolis

Exclusive West Coast Subdistributors
BRUMLEY-DONALDSON COMPANY
Los Angeles · Oakland

NATIONAL
METAL ABRASIVE COMPANY
3560 Norton Rd. · Cleveland 11, Ohio
Western Metal Abrasives Co. (Affiliate)
101 E. Main Street · Chicago Heights, Illinois
Sole manufacturers of Permabrasive® and Controlled "T"® abrasives.



build, repair or waterproof
concrete construction with
GUNITE®
the sand-cement product of the
CEMENT GUN®

Gunite Specialists for 48 years
Call us for information and bids

PRE-STRESSED TANKS
RESERVOIR LININGS
PRESSURE GROUTING
SANDBLASTING
STEEL ENCASEMENT
REFRACTORY LININGS
CONCRETE REPAIRS
STACK & BUNKER LININGS

Gunite Contractors and
sole manufacturers of the
CEMENT GUN

CEMENT GUN COMPANY
1518 Walnut Street, Allentown, Pa.
General Offices, Allentown, Penna.
HEmlock 2-1002

Circle 765 on Page 53

force
. . . power to persuade
or convince.
(see page 69)

Circle 766 on Page 53

Obituary

Werner G. Smith, 71, chairman of the board, Werner G. Smith Inc., Cleveland, and former executive vice president of Archer-Daniels-Midland Co., died April 6. Early in his career he entered the core oil business when he founded the Werner G. Smith Co. in Cleveland. In 1929 he sold his company to ADM and became executive vice president and a director of the latter and managing head of its Wern-

WERNER G. SMITH

er G. Smith Div. He resigned in 1950 and again organized his own business, for the manufacture and sale of core and other types of oils. He was its president until 1955.

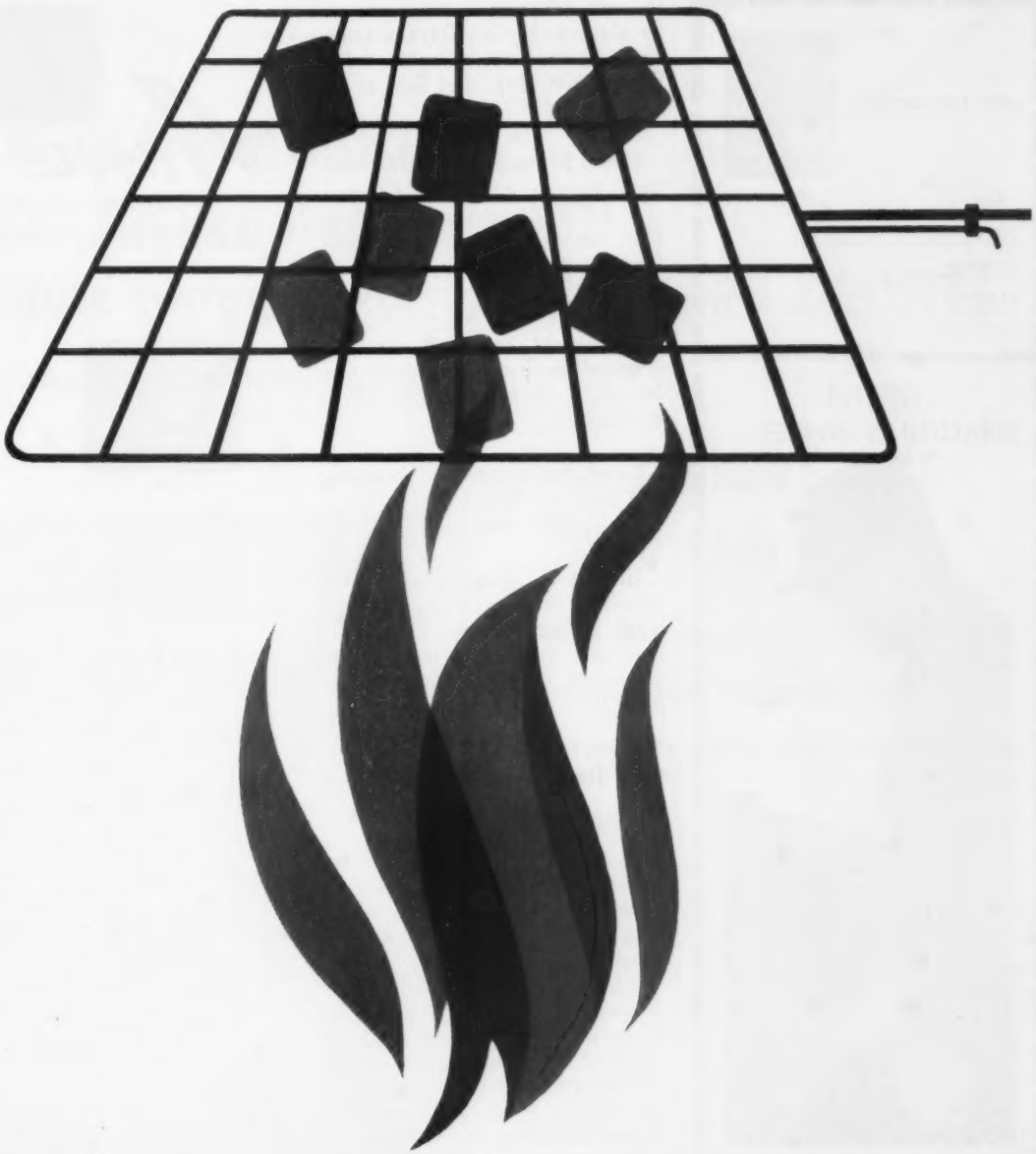
J. F. Brunner Sr., co-founder of Kay-Brunner Steel Products Inc., Alhambra, Calif., died Mar. 26.

Andrew J. Riley, owner, John F. Riley Foundry & Machine Works, Charleston, S. C., died Mar. 19.

Victor W. Hain, for 15 years western Michigan sales representative for Frederic B. Stevens Inc., Detroit, died Mar. 17. He was formerly with Premier Furnace Co., Dowagiac, Mich., as foundry manager.

Morris Isaacson, 67, since 1928 vice president of R. Lavin & Sons, Chicago, died Feb. 29 in Miami Beach, Fla.

Thomas H. Beaulac, 68, for 18 years foundry superintendent, Chicago Pneumatic Tool Co., Franklin,



toasted nickel briquettes for low H_2 diet

Sherritt's recipe for making low-hydrogen nickel is as effective as it is simple: take pure nickel powder, press into uniform briquettes, and heat for a quarter of an hour at 1650°F. The result: pure nickel in its handiest form, with scarcely a trace of hydrogen. High-purity Sherritt nickel is also available in three standard grades of powder, special grades, and coated powders.

FOOTE MINERAL COMPANY *is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For complete illustrated brochure with prices and delivery information, contact the Foote Mineral Company, 473S Eighteen West Chelten Building, Philadelphia 44, Pa.*

SHERRITT GORDON MINES LIMITED

Circle 768 on Page 53

SEND FOR CATALOG F

NAME

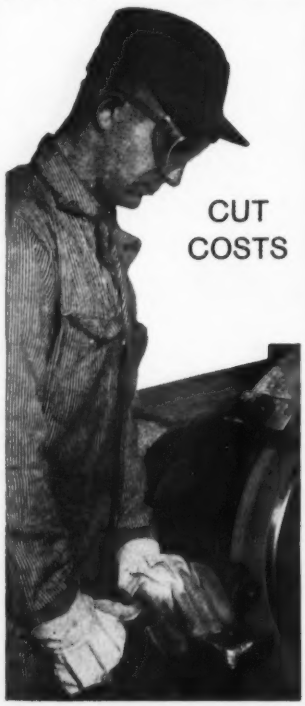
TITLE

COMPANY

STREET

CITY/STATE

DRESS SNAGGING WHEELS:



Coarse snagging wheels grind faster, last far longer when dressed regularly with a Desmond Heavy Duty dresser. Even on high-speed resinoid and rubber bonded wheels inexpensive Desmond mechanical dressers expose new, sharp grains and provide a fresh, unloaded surface. Desmond Hex and Huntington dressers are widely used on large and medium size vitrified and silicate wheels. Desmond dressers soon pay for themselves.

The only complete line of grinding wheel dressers and cutters

Desmond

Desmond-Stephan Mfg. Co.
Urbana, Ohio

Circle 769 on Page 53

Pa., and later a sales representative for Dayton Oil Co., Dayton, Ohio, and Bloomsbury Graphite Co., Bloomsbury, N. J., died Feb. 4. He retired in 1957.

Sidney E. McGinty, 51, sales manager, Firegan Sales Co., Chicago, was killed in an airplane crash Mar. 20. He was formerly with Burnside Steel Foundry Co., Chicago.

Ephraim H. Brown, 58, secretary and a director of Ohio Brass Co., Mansfield, Ohio, died Mar. 23 in Washington.

Joseph A. Coleman, vice president and treasurer, Madison-Kipp Corp., Madison, Wis., died Feb. 25.

Herbert L. Mausk, 69, former sales vice president, National Malleable & Steel Castings Co., Cleveland, died Feb. 13, at his home in Tryon, N. C. Mr. Mausk retired in 1957.

Gray Iron Founders' Society Sponsors Design Contest

Each entrant in the 1960 design contest of the Gray Iron Founders' Society will receive a copy of the *Gray Iron Castings Handbook,* which is valued at $10.

Primary purpose of the annual competition is to give recognition to designers, engineers, and buyers of gray and ductile iron castings. Anyone connected with the metalworking industry is eligible to compete. Entries are judged on the following: 1. How the design or redesign did or could increase the efficiency of a product. 2. Cost savings. 3. Potential commercial importance to the gray iron industry as a whole. 4. Ingenuity of the design.

First-prize winner will receive $500 and a citation, second prize is $100 and a citation, and third through seventh prizes will be awarded $50 each and a certificate of recognition. Prizes will be awarded at the society's annual meeting next October in Cincinnati. Deadline for entries is May 31.

Official entry blanks and a folder illustrating last year's winners are available from the Gray Iron Founders' Society Inc., National City-East Sixth Bldg., Cleveland 14, Ohio.

Acme

NON-FERROUS

MELTING POTS • INGOT MOLDS

Special Alloy

EXTENDS LIFE . . . NO HOT SPOTS!

Acme melting pots and ingot molds assure even heat distribution without hot spots . . . they improve non-ferrous casting quality and put a damper on rejects. Cast of a specially-developed iron alloy, Acme pots and molds provide great strength and unusual resistance to high temperatures, too. As a result they consistently reduce down time and substantially cut replacement costs.

Stocked in forty sizes and a complete range of styles, you can standardize on Acme melting pots and molds and be confident of immediate shipment at all times! Take advantage of all these benefits . . . proven over a period of more than 30 years.

FORTY SIZES IN STOCK

Quick delivery anywhere in the United States eliminates your "stand-by" non-ferrous pot and mold inventory. Write for bulletin listing all sizes and styles.

Acme

FOUNDRY CO.

2502 22nd St., DETROIT 16, MICHIGAN
Phone TA 5-2404

Circle 770 on Page 53

CUPOLA-CONTROLLED FOR INCREASING YOUR . . . . . FOUNDRY PROFITS

with ABC FOUNDRY COKE

ABC's 27" I.D. test cupola in operation.

YOU CAN:

- **Use a cheaper ingoing metal charge**
- **Improve coke to metal melting ratios**
- **Reduce "sick cupola" shutdowns and excessive coke boosters**
- **Maintain consistent carbons and temperatures**

Only ABC Foundry Coke is cupola-controlled—prechecked in a production-size cupola for carbon absorption and melting temperature. These regular tests supplement physical and chemical analyses. Quality variations that show up only in cupola operation are detected quickly and are corrected before variations occur at your foundry.

Many foundries find that ABC test cupola results correlate with their own, enabling them to plan cupola operations more precisely. Results are available to ABC customers on request.

ABC's test cupola is also a research tool for developing new cokes according to need and improving the quality of existing types for your benefit.

A trial of ABC Foundry Coke will prove to you the superior performance that leads to greater profit.

ALABAMA BY-PRODUCTS CORPORATION

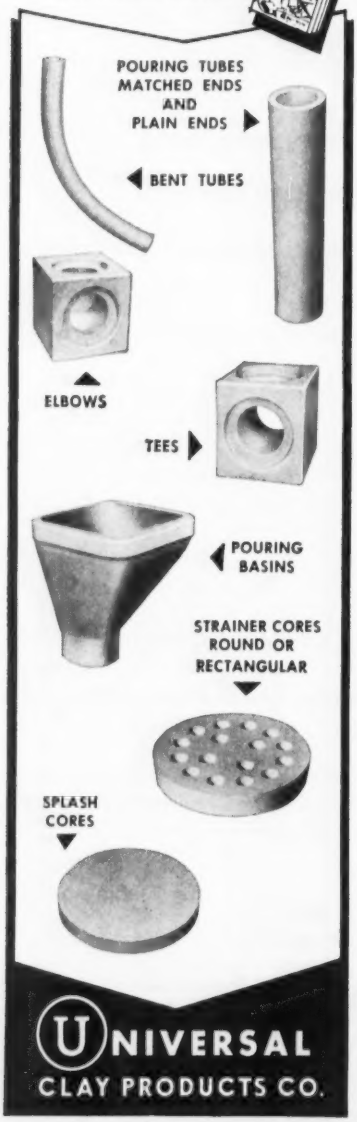
General Sales Office:
First National Building
Birmingham, Alabama

Sales Agents:
Great Lakes Foundry Sand Company, Detroit; St. Louis Coke & Foundry Supply Co., St. Louis; The Ranson and Orr Company, Cincinnati; Kerchner, Marshall and Company, Pittsburgh; Balfour, Guthrie & Company, Ltd., San Francisco; Anselman Foundry Services, St. Charles, Illinois

UNIVERSAL
REFRACTORY GATING COMPONENTS

• The *Thinwal* construction, providing as much as *35% lighter weight* will not spall nor erode in use even at temperatures up to 3250°F. They eliminate slag inclusions, stop rejects, reduce cleaning room time.

Standards and specifications bulletin available on request. Units for special applications quoted.



UNIVERSAL
CLAY PRODUCTS CO.

1515 First St. • MAin 6-4912 • Sandusky, Ohio
P.O. Box 1631

Circle 772 on Page 53

Courts Affirm Validity Of Escalator Clauses

Contract Need Cover Only How Price Is Determined

By Albert W. Gray

Courts have rendered many decisions affirming the validity of escalator clauses in contracts when clear provisions are made for the method of price determination.

For example, a contract for the sale of approximately 16 tons of scrap metal at a stipulated price per pound contained the clause, "All materials purchased subject to mill grading for final settlement."

A controversy came before a court of that state over deductions made by the purchaser for foreign substances in this scrap. The seller contended that this clause was ineffectual in that it was too vague and uncertain to be a factor in the establishment of the sales price. This conclusion the court refused to adopt. It held that this manner of price determination was legal and binding on the parties to the contract.

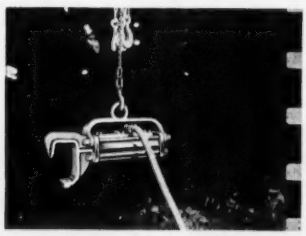
Agreement To Agree—In another recent case in California involving this same feature of the law, the Supreme Court of that state said, "Where a contract is so uncertain and indefinite that the intention of the parties in material particulars cannot be ascertained, the contract is void and unascertainable. If the price of a commodity in a sales contract is intended to be left to the subsequent agreement of the parties, the purported contract is merely an agreement to agree and therefore not a valid contract until the price is fixed or agreed upon."

Of the other phase of such stipulations, the court continued, "Unexpressed provisions of a contract may be inferred from the writing or external facts. Thus it is well settled that a contract need not specify price if it can be objectively determined."

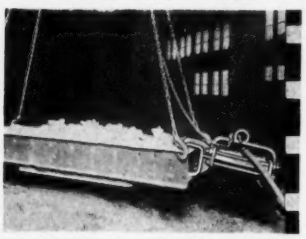
Another instance of this character occurred in Oregon. Provision in a sales contract made by a petroleum refiner of gasoline with a retail dealer was that the price "shall be four cents less than the company's full market price in North Powder, Oreg., which full

A "BRANFORD" MOVIE

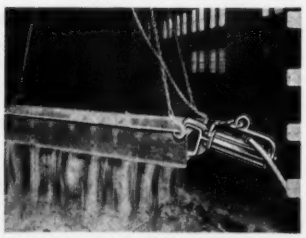
A RE-RUN OF
"ONE TOUGH GUY"
Produced 1915 by BRANFORD
CAST . . . . YOUR OWN



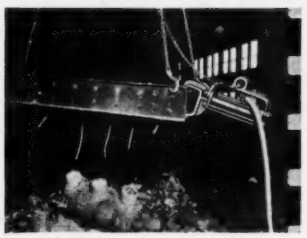
I'm Movin' in . . . SEE!



I'm takin' over . . . SEE
You can't Beat THIS RAP!



It's a Shakedown SEE!

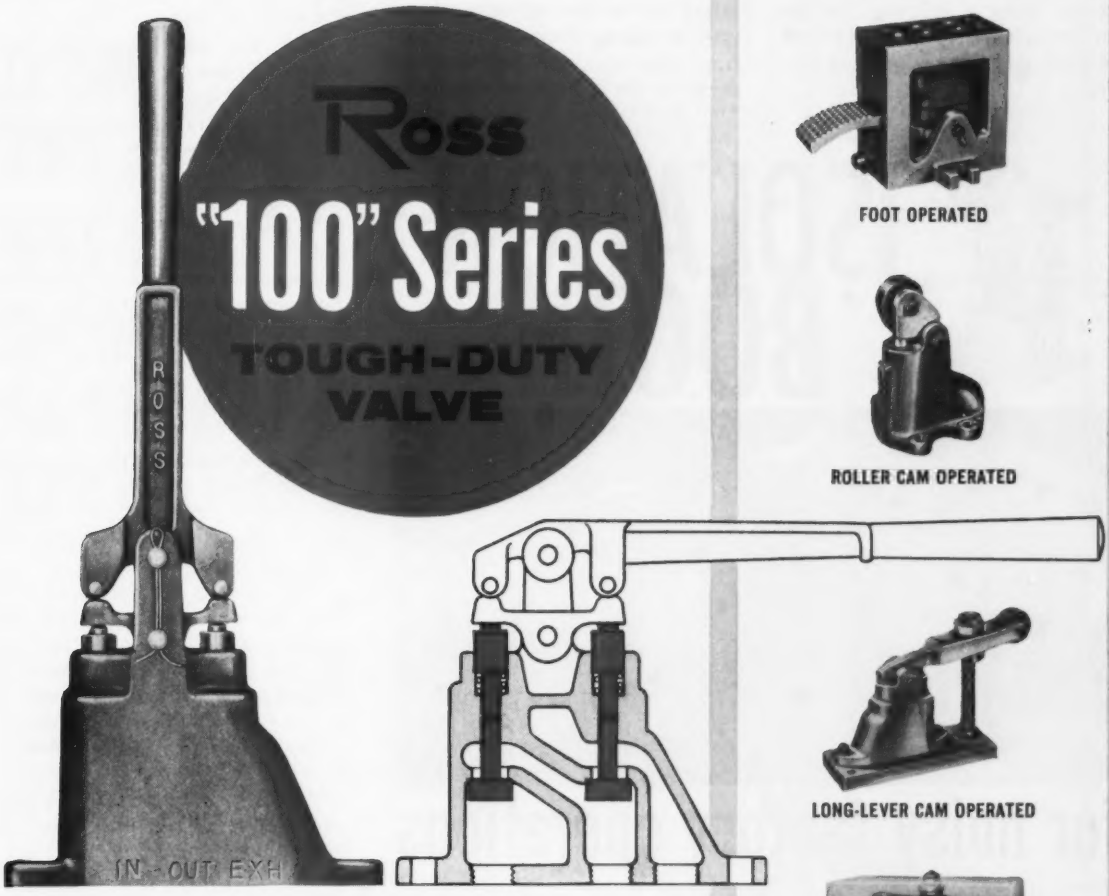


SEE BUD? *Just 5 Sec's*
Man You're REAL GONE!

The WRITE For A Cool Cat.
"BRANFORD"
Company
BOX 427, NEW BRITAIN, CONN.

Circle 773 on Page 53

Give this valve your *ROUGHEST* jobs!



foot, cam, solenoid versions available, too

FOOT OPERATED

ROLLER CAM OPERATED

LONG-LEVER CAM OPERATED

SOLENOID DIRECT OPERATED

Steel mills, foundries, mines, offshore drilling, logging . . . these industries love the Ross "100" Series valve. Here's why: It performs well wherever you need a manually operated valve, but it is really the finest, most dependable valve available for use where the environment is rough and tough. The "100" Series valve will pass most dirt and foreign matter with no trouble and has only a few moving parts. Its poppets travel only a scant fraction of an inch, so it is especially wear resistant. It transmits a "feel" of control to the operator so he may "inch" a cylinder with fine control. Available in locking or non-locking, 3 way or 4 way, closed or cracked-to-exhaust-center models, with handle normally upright or horizontal. Write for further information.

STAY AHEAD
MODERNIZE

Ross OPERATING VALVE COMPANY
107 EAST GOLDEN GATE AVE. • DETROIT 3, MICH.

Circle 774 on Page 53

market price is understood to be no cents higher than the company's posted full market price at its bulk depot at Baker, Oreg."

Later, suit was brought against the refiner on the ground that deliveries had not been made as agreed, together with a controversy over the price the dealer should pay under this agreement. In awarding the dealer a judgment for the damages claimed for nondelivery, the court said this of the price provisions:

"The refiner particularly stresses the contention that the price was not definitely fixed and for that reason the contract is invalid. To constitute a sale the price need not be definitely fixed at the time the sale is effected if the agreement contains express or implied provisions by which it may be rendered certain. There could be no uncertainty as to the refiner's market price at North Powder. The contract expressly provides that the price to the purchaser should be four cents per gallon less than that."

Right To Change—Under a contract made with a purchaser in Ohio, the purchaser agreed to buy at list prices to be established from time to time by the manufacturer, less a discount of 50-10-10 per cent with the right reserved by the manufacturer to change the discounts when competitive market conditions warranted so doing.

Later suit was brought by the seller for a breach of the contract. It was contended in the defense that the contract, failing as it did to set a stipulated price, was void for indefiniteness and the absence of any agreement.

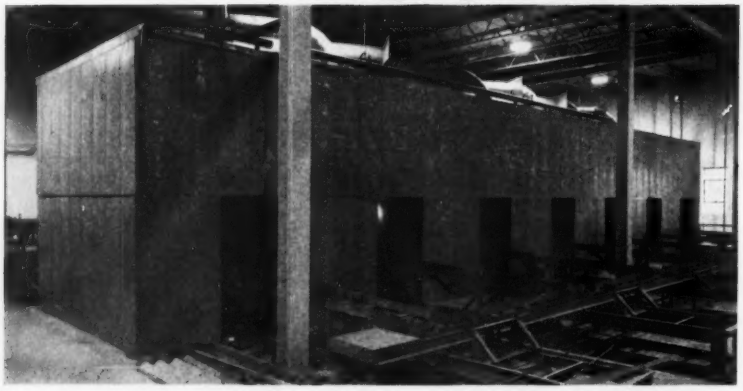
"While the price is not fixed," said the court, "it is capable of definite ascertainment by reference to the manufacturer's list prices even though the latter reserved the right from time to time to change prices and rate of discount."

Again, under a sales contract involved in a suit before the Federal court in Tennessee, provision had been made that the sales were "subject to prices in effect on shipping date." That contract also, was held valid and enforceable.

"The contract did not specifically state the price to be paid for the goods on delivery. To constitute a sale, the price need not be definitely fixed at the time of the sale if the agreement contains express or implied provisions by which it may be rendered certain.

"Whether the price to be paid was the market price at the time of delivery, as claimed by the purchaser, or the price fixed by the manufacturer at its factory, as the

ISOLATION BOOTH



for noisy factory operations

ISOLATE the din and clatter of loud factory operations easily and quickly. Noises can be absorbed or isolated with Koch's easy-to-erect Soundbar Panels. Standard dimensioned panels fit together rapidly to construct a room-within-a-room to control the clamor of factory, mill, or foundry. Noise is not only isolated, it is muffled as well. The unique design of Koch's Soundbar Panels permits "chain erection" to complete a sound suppressed room in hours instead of days. These incremental modular panels lock tightly into each other to form rigid walls of any length . . . any height.

Sturdy steel panels, four inches thick, contain sound-silencing filler. Millions of tiny pores in the skin of the panel trap the sound waves and muffle them within the blanket of insulation. Reverberations within the room or booth are reduced to a minimum.

Simple to erect
Minimum installation cost
Sturdy, all-steel welded panels
Vermin-proof, noise-proof, dust-proof
Light weight, easy to handle
Sound absorption coefficients up to 99%

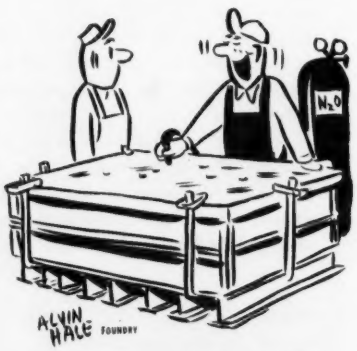
DESIGNING ENGINEERING
FABRICATING

- Exhaust Systems
- Air Make Up Systems
- Ventilating Systems
- Finishing Systems for Wood and Metal

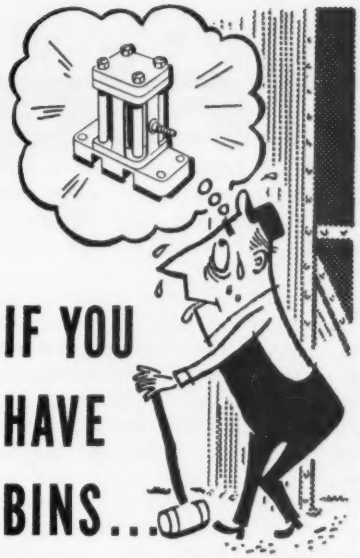
Since 1873, Koch's vast experience serving business and industry has made them experts in engineering the transfer and control of heat, cold, dust, fumes and sound!

WRITE FOR SPECIFICATIONS AND DATA — DEPT. F49

GEORGE KOCH SONS, INC.
Evansville 4, Indiana



"Haha, they were out of CO_2, haha, but the man said N_2O would do just as good, haha"



IF YOU HAVE BINS...

You should have

CLEVELAND VIBRATORS

Anyone who stores materials in bins will find a vibrator an economic necessity. Bin vibrators completely overcome plugging and jamming.

The only substitute is a sledge hammer. This involves first, valuable man hours and secondly, expensive bin damage.

A bin vibrator will eliminate these costs. As a result, they will pay for themselves in a very short period of time, actually a matter of weeks.

The Cleveland Vibrator Company offers you complete engineering service on both air and electrically operated vibrators.

If you use bins, chutes, or hoppers you can save valuable dollars, by writing today for complete information and prices on Cleveland Bin Vibrators.

Dept. 5H, 2788 Clinton Ave., Cleveland 13, O.

See us at the American Foundrymen's Society Show, Booth 330

Circle 776 on Page 53

seller asserts, the data for determining the price were present and easily ascertainable."

Basis for Validity—Of the law governing circumstances of this character the United States Court of Appeals, a few years after this decision, made a clear and succinct statement which since has been followed generally to determine the validity of escalator clauses and provisions for the future setting of contract prices.

"There is no objection to a promise that it is indefinite so long as the parties can tell when it has been performed, and it is enough if, when the time arrives, there shall be in existence some standard by which they can be tested.

"It often is said that such a standard must not be one within the uncontrolled power of the promisee, as, for example, that the promisor shall buy at any price which the promisee may fix. Yet if there be an independent consideration, it is hard to see why, on principle, such a promise is unenforceable however inconsidered and unwise."

REFERENCES

California Lettuce Growers v. Union Sugar, 289 Pac. 2d 785, California, November 8, 1955

Moore v. Shell Oil Co., 6 Pac. 2d 216, Oregon, December 15, 1931

Memphis Furniture Mfg. Co. v. Wemyss Furniture Co., 2 Fed. 2d 428, Tennessee, November 7, 1924

Moon Motor Car Co. v. Moon, 29 Fed. 2d 8, New York, November 19, 1928

American Standards Group Issues Revised Safety Code

Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, is available from the American Standards Association. The 46-page standard is sponsored by the Department of the Navy, the National Bureau of Standards, and the United States Bureau of Mines.

Purpose of the code is to provide reasonable and adequate means and methods for the proper selection and safe use of head, face, neck, eye, and respiratory protective equipment. It applies to all operations or processes except those relating to communicable airborne diseases or x-rays, gamma rays, and high-energy particulate radiations. The code generally is a revision of the previous edition of 1938.

Copies of the standard are available from the American Standards Association, Dept. PR121, 70 E. 45th St., New York 17, N. Y., at $3 each.

A SKILLED HAND IN CHEMISTRY...AT WORK FOR YOU

NOPCOWAX® 22-DS

...ideal lubricant for shell sand-coating

Nopcowax 22-DS, a high melting, synthetic industrial wax, was specially developed by Nopco for hot and cold shell sand-coating. It offers the shell molder a substance for both internal and external lubrication. Small quantities of Nopcowax 22-DS, added during the mixing cycle, prevent lumps and leave the mixture free-flowing.

In using Nopcowax 22-DS, you get all these advantages:

- Assured mold release
- Stronger cured molds
- Free-flowing mix in investment box
- Complete lubricant burn-off from the pattern

For better results in your shell molding operations, write the Metal Processing Department for samples and literature on Nopcowax 22-DS.

NOPCO® NOPCO CHEMICAL COMPANY
60 Park Place, Newark, N.J.
Plants: Harrison, N.J.
Richmond, Calif. • Cedartown, Ga. • London, Canada

Circle 777 on Page 53

The Shakeout

Stainless Mixing Blade Increases Production

CAST STAINLESS (type CF-16F) mixing blade has doubled production and improved quality at Bialy's Inc., Flushing, N. Y. The blade, which is capable of

mixing 900 lb of straight dough in 90 min, was designed by Peerless Bread Machinery Corp., Sidney, Ohio.

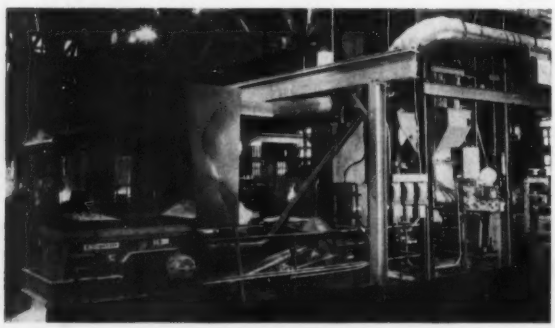
Because cast stainless offers excellent corrosion resistance, the agitators do not discolor the mix or leave metallic impurities. Blade is designed to give a figure-8 mixing action. Working edge of the blade has a slight point to facilitate cutting through the dough and to speed mixing.

The blade can be made in an integral 160 to 400-lb piece, depending on mixer size. Alloy is resistant to corrosion from organic acids and salts produced in the breakdown of sugar and starch, from enzyme action of yeast, and from cleaning chemicals and mechanical brushing and scouring.

For More Details Circle No. 518—Page 53

Magnetic Pulley Salvages Back-Up Sand

FOUNDRY SAND reprocessing system recently installed at Vollrath Co., Sheboygan, Wis., incorporates a ceramic-type magnetic pulley built by Stearns Magnetic Products, Milwaukee. Vollrath produces stainless steel castings weighing up to 200 lb and uses only clean sand for facing. Reprocessed sand is used for back-up. All sand reprocessed in the new system can be salvaged. The company not only salvages 18 to 20 tons of sand daily, but also has reduced muller maintenance greatly.

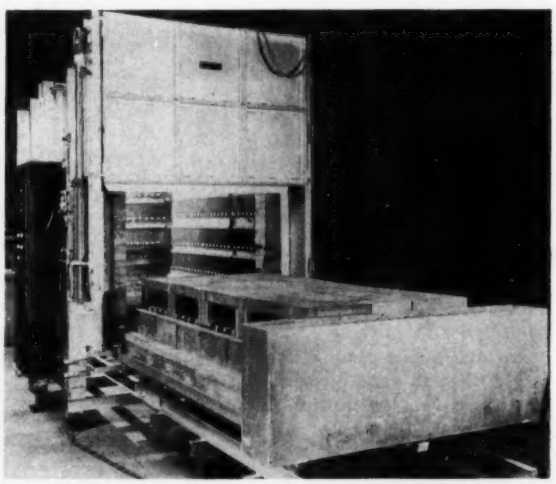


A front-end loader dumps sand into the hopper of a twin-screen mechanical shaker unit, shown at left. First screen removes larger pieces of tramp metal and reduces sand lumps. Second takes out medium-size pieces. Smaller particles and sand drop onto an upwardly inclined conveyor belt which carries its load over a 15-in. diam, 20-in. wide permanent magnet pulley. Tramp metal which remains is removed by the pulley and dropped into a sump. Clean sand is dumped into a vertical bucket conveyor which carries it to a muller for remixing.

For More Details Circle No. 519—Page 53

Furnace Assures Uniform Heat Treatment

ELECTRIC-HEATED car bottom furnace reportedly delivers uniform temperature, with no more than 3 degrees variation in all sections of the furnace. It was designed to heat treat large numbers of high-alloy castings simultaneously. The heating elements are in side walls, back wall, the door, and under the hearth of the car. These elements are of 80-20 nickel alloy and are



suspended on insulators to provide good support. Elements are connected to 440-v, 3-phase, 60-cycle current, and watts density on the ribbon is 10 w per sq in.

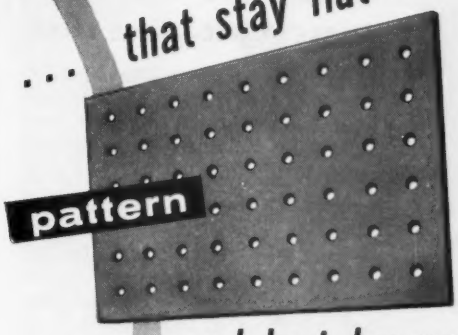
The furnace is equipped with a combination temperature control and electric panel, in a floor-mounted cabinet.

Lining is 12 in. thick and consists of various courses of firebrick and block insulation. Unit measures 48 in. wide, 32 in. high, and 96 in. long and is mounted on four ball-bearing wheels. Door is made of ribbed steel plate. Two air cylinders, one on each side of the door, operate by a foot valve to provide ease of lifting. The furnace is made by Waltz Furnace Co., Cincinnati.

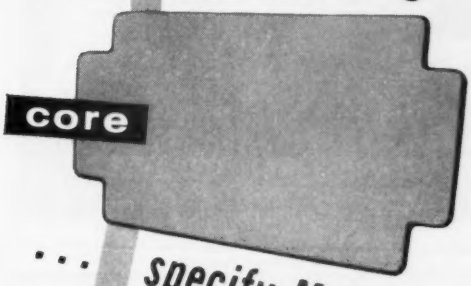
For More Details Circle No. 520—Page 53

for plates

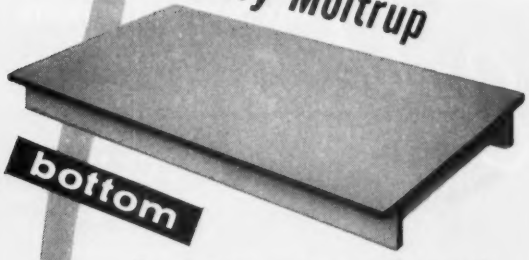
... that stay flat



... and last longer



... specify Moltrup



For accurate casting results specify Moltrup Plates. They are long-lasting and stay flat—because Moltrup employs a special flattening process designed to permanently eliminate buckling or bending. Consequently your investment goes further and your profit margin increases. Plates are made to your specifications. Write or phone us for complete information.

Phone: TIlden 6-3100

Moltrup
Steel Products Co.
Beaver Falls, Pa.

Pittsburgh, Pa. Erie, Pa. Chicago, Ill. Detroit, Mich.
New York, N. Y. Syracuse, N. Y. Cincinnati, O.
Cleveland, O. Los Angeles, Calif.

F-2

Circle 778 on Page 53

You get MORE with

MOROC®

the controlled silicate CO_2 binder

MORE SPEED. Curing time ranges from ten seconds to three minutes, depending on type of mold or core.

MORE LABOR SAVING. Cores are ready for use when they come from core box. You eliminate movement to and from ovens, handling of core driers, cementing of halves.

MORE FLEXIBILITY. Fast curing means faster handling of rush orders. There's no need to stockpile cores for future orders. You have the flexibility to meet customer needs on schedule.

MORE PROFIT. With MOROC you can get this extra capacity and flexibility with a smaller investment in equipment than would be required for additional ovens or shell-molding equipment.

MOROC COMES IN FOUR GRADES

MOROC 1. High-strength binder.

MOROC 2. High-strength and good collapsibility.

MOROC 3. High-strength and high collapsibility to meet demands of core-blowing equipment.

MOROC 4. Extra-high collapsibility and good flowability.

Other Diamond Chemicals for the foundry:
Soda Ash (briquettes & granulars) Caustic Soda, Chlorine, Solvents

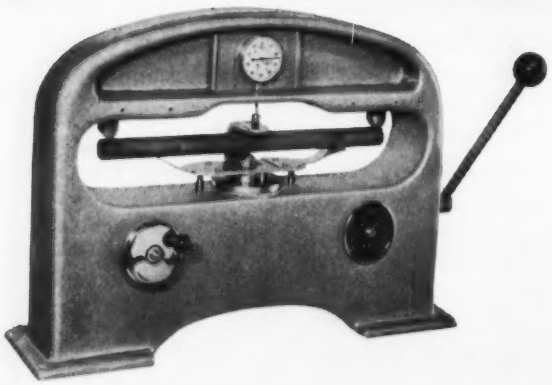
Write for complete information. Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond® Chemicals

Circle 779 on Page 53

FOUNDRYMEN!!

NOW...A 4 MINUTE GRAY IRON TEST



- Obtain accurate technical data on brittleness and strength as soon as test bar has cooled.
- Test data complies with Federal Specifications QQ-1-652.
- No experience necessary... no need to shield from factory dust.
- Tester is bench type, requires little space. Low in cost and trouble-free.

PRESS

Send for folder
Write, wire or phone
for complete details

PASADENA HYDRAULICS INC.
1433 Lidcombe, El Monte, California

Circle 780 on Page 53

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

Circle 781 on Page 53

WORK TESTED and TIME PROVEN

Euclid SERIES S

FEATURES

- Compact, Trouble-free.
- One-piece, heavy steel.
- Combination hoist frame and gear housing prevents misalignment or oil leakage.
- Complete motor interchangeability permits use of any (Standard NEMA "D" Flange Mount Series 180 or 210) motor with integral disc brake.
- Chain racked trolley for economy when handling speed is not the key factor. (Easily converted to motor drive.)

Competitively priced, these hoists incorporate all the desirable features of design, operation and maintenance that have characterized Euclid products for more than 50 years.

"S" Hoists are also offered with lug and hook-on suspensions, plain trolley and motor propulsion units. Write for data.

EUCLID

THE EUCLID CRANE & HOIST CO.
1365 Chardon Road • Cleveland 17, Ohio

Circle 782 on Page 53

SCIENTIFIC
PRESSURE CAST
MATCHPLATES

CHECKED FOR QUALITY
7 WAYS

Inspected at 7 points of manufacture for highest possible matchplate quality . . . Scientific is the only producer using patented new Fortschneider Shift Indicator.

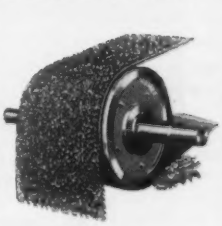
THE SCIENTIFIC CAST PRODUCTS CORP.
1390 East 40th Street • Cleveland 3, Ohio

See Us At Booth No. 427, A.F.S.
Circle 783 on Page 53

2 WAYS TO REDUCE COSTS

USE HOMER MAGNETIC PULLEYS . . .

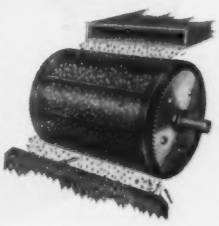
Homer Permanent Magnetic Pulleys in belt conveying systems cut costs in a multitude of metal-working operations. They automatically remove tramp iron from coke, slag, ores, foundry sand, etc . . . sort ferrous from non-ferrous parts . . . and segregate ferrous from non-ferrous materials, minerals, etc. Trouble-free with no D.C. power supply required. Homer's "Radial Pole Design" assures highest magnetic strength across entire working face of pulley for deep, effective penetration and positive control of magnetic materials.



Complete details in Bulletin PY-260. Write for it today.

USE HOMER MAGNETIC DRUMS . . .

Homer Permanent Magnetic Drums automatically and economically beneficiate ores . . . remove tramp iron from slag, coke, foundry sand, ores, etc. . . . and separate ferrous parts from abrasive material following tumbling barrel operations. For installation at discharge end of gravity, screw or belt conveying systems and for use with tumbling barrels. Homer's "Radial Pole Design," with permanence of magnetic strength guaranteed, assures maximum effectiveness at all times.

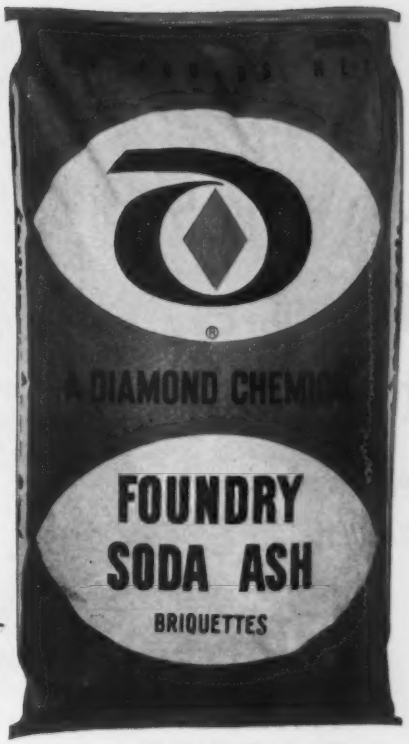


Complete details in Bulletin MD-200. Write for it today.

HOMER MANUFACTURING DIVISION
THE OHIO ELECTRIC MANUFACTURING CO.
DEPT. 156 • LIMA, OHIO

Circle 784 on Page 53

NEW



DIAMOND FOUNDRY SODA ASH BRIQUETTES

for fast, efficient, desulphurizing action

No inactive ingredients to add to cost. Pillow shaped for easy handling and fast, efficient desulphurization of molten metal in cupola or ladle. Diamond Foundry Soda Ash Briquettes permit greater use of scrap metal in melting, release entrapped gases and increase fluidity. Tough, moisture-proof 100-lb. bags keep them dry, effective and safer to use.

For prompt shipment and technical assistance, call your nearest Diamond sales office.
Diamond Alkali Company, Cleveland 14, Ohio

4701 Paddock Cincinnati, Ohio REdwood 1-3200	12 South 12th St. Philadelphia 7, Pa. WAlnut 5-8017	4246 Forest Park Blvd. St. Louis 8, Mo. JEfferson 5-2232
20 N. Wacker Dr. Chicago 6, Ill. STate 2-9550	Oliver Building Pittsburgh 22, Pa. GRant 7-7500	Box 2088 DeSoto Station Memphis, Tenn. BRoadway 2-1736
633 Penton Bldg. Cleveland 13, Ohio SUperior 1-8683	1006 Main St. Houston 2, Texas FAirfax 3-7329	99 Park Avenue New York 16, N. Y. OXford 7-0440

Other Diamond Chemicals for the foundry: MOROC, silicate CO_2 binder, Caustic Soda, Chlorine, Solvents

Diamond Chemicals

Circle 785 on Page 53

How to add Titanium to Aluminum

ECONOMICALLY!
EASILY!

use **B&A®**
POTASSIUM TITANIUM FLUORIDE (K_2TiF_6)

Whether your process is smelting or casting, you'll find B&A Potassium Titanium Fluoride costs less than other methods of incorporating titanium into aluminum alloys. This easy-to-use salt can help lower your production costs and improve the quality of your aluminum and aluminum products.

Here's how: In smelting, add B&A Potassium Titanium Fluoride after the metal has been treated with B&A Potassium Fluoborate or any other good purifying flux and the dross removed. This addition can be made *directly* to the pot when temperatures are in the range of 1450° F or higher. In casting, use either a mixture of this salt with B&A Potassium Fluoborate (for lower melting point) or, more conveniently, use B&A Potassium Titanium Fluoride–Potassium Fluoborate Eutectic mix.

You get all these benefits:

- **lower cost**
- **finer grain structure**
- **higher tensile strength**
- **greater elongation**
- **better machinability**

For further information, call or write the nearest B&A office listed below. Why not right now?

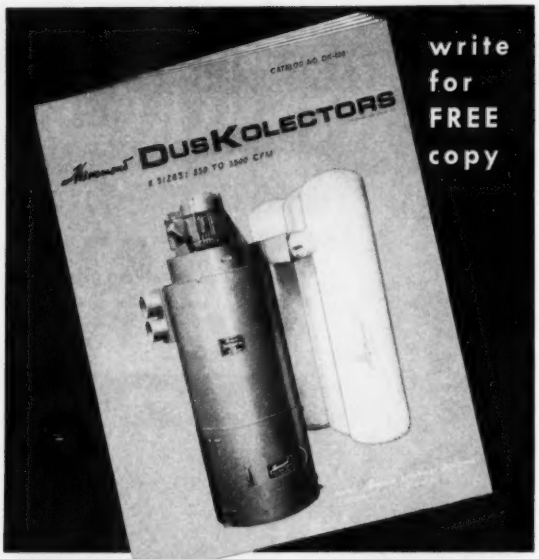
BAKER & ADAMSON® Fine Chemicals

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston Jacksonville • Los Angeles • Milwaukee • Minneapolis • New York Philadelphia • Pittsburgh • Portland (Ore.) • Providence • St. Louis San Francisco • Seattle

Circle 786 on Page 53



write for FREE copy

new **"HOW-TO-DO-IT" CATALOG ON DUST AND MIST COLLECTING** Includes application suggestions, installation views, cut-away diagrams, dimensions . . . A wealth of practical guidance for DUST CONTROL which will improve working conditions and cut maintenance costs in your plant.

Hammond Machinery Builders
1605 Douglas Ave. Kalamazoo, Mich.

Circle 787 on Page 53

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

No. 4-A
Self-Dumping

PENN IRON WORKS, INC.
READING, PENNA.

Circle 788 on Page 53

SPRAY NOZZLES

greater choice of patterns

Full Cone

Hollow Cone

Square Spray

Flat Spray

greater choice of capacities

greater choice of materials and spray nozzle types

WhirlJet hollow cone spray

FullJet full cone spray

Pneumatic Atomizing Nozzle

FlatJet flat spray

Over 12,000 Standard Spray Nozzles for more exact performance to fit your needs

For complete information write for Catalog No. 24

SPRAYING SYSTEMS CO.
3238 Randolph Street • Bellwood, Illinois

Circle 789 on Page 53

HEAVY DUTY
MODEL K

SPECIALLY SUITED TO PRODUCE FERROUS AND NON-FERROUS LONG TUBULAR CASTINGS

Castings up to 32 inches in diameter and 20 feet in length. These machines are ideal for jobbing foundry work as well as production.

Cast tubes of all alloys of non-ferrous metal as well as cast iron, alloy irons, steel, alloy steels and stainless steels.

Highly efficient type of water-cooling for permanent molds.

Trunnion machines built in many size ranges for specific requirements.

Illustrated Folder No. 160 Available on Request.

CENTRIFUGAL CASTING MACHINE CO.
P. O. BOX 947 TULSA 1, OKLAHOMA

Circle 790 on Page 53

SAVE TIME AND MONEY

GET CLEANER BETTER CASTINGS

TEX-VENT®

FLEXIBLE TEXTILE CORE VENT FOR IRREGULAR-SHAPED CHANNELS IN SAND CORES

Foundry Tested For Over Two Years

Proven Effectiveness
— Especially For Cold Setting Processes

TEX-VENT IS BETTER . . .

- allows unrestricted use of cold setting processes
- disintegrates completely, even under moderate heat . . . leaves no residue
- no sealing produced around core vent
- will not reduce permeability of core
- reduces porosity in castings . . . shortens finishing time . . . fewer rejects occur
- reduces core baking time
- unaffected by temperature changes while being stored

IN 1/16", 1/8", 1/4", 3/8" AND 1/2" DIAMETERS
Available On Spools For Easy Handling
WRITE FOR DESCRIPTIVE LITERATURE AND SAMPLES

Carried In Stock On West Coast By:
Jones Foundry Supply
718 E. 60th St., Los Angeles, Cal.

Order Through Your Nearest Supply House —
Or Directly From

DOMESTIC industries inc
SOLE U.S.A. DISTRIBUTOR
470 W. Broad St. COLUMBUS 22, OHIO

Circle 791 on Page 53

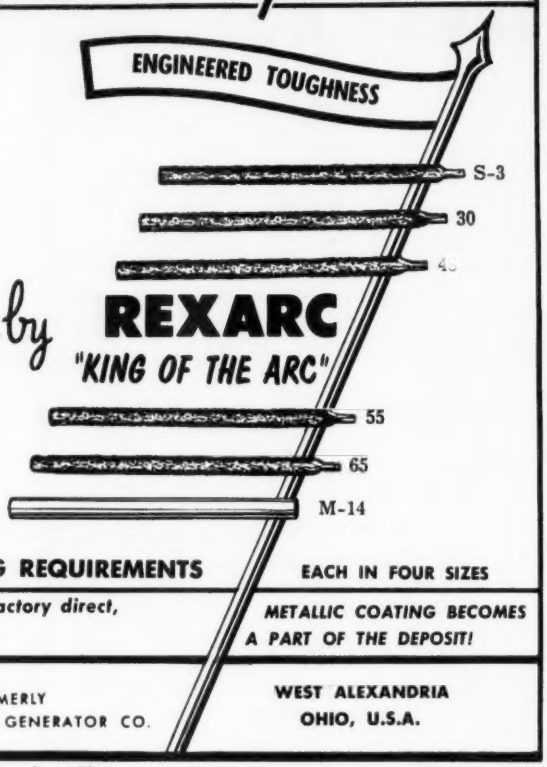
BETTER WELDS · SMOOTHER, EASIER APPLICATIONS · ADDITIONAL SAVINGS · BETTER WEAR RESISTANCE

A royal proclamation by

REXARC

"KING OF THE ARC"

ENGINEERED TOUGHNESS



presenting:

SIX ELECTRODES

TO COVER 95% OR MORE OF YOUR BUILDUP AND HARD-FACING REQUIREMENTS

EACH IN FOUR SIZES

Contact your nearest distributor, or the factory direct, for free 20-page manual

METALLIC COATING BECOMES A PART OF THE DEPOSIT!

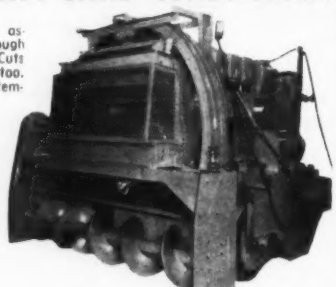
MANUFACTURED BY Rexarc INCORPORATED FORMERLY THE SIGHT FEED GENERATOR CO.

WEST ALEXANDRIA OHIO, U.S.A.

Circle 792 on Page 53

IMPROVE YOUR COMPETITIVE POSITION WITH A RINGLIFT SAND CONDITIONER

A Ringlift Sand Conditioner assures better castings through improved molding sand. Cuts sand preparation costs too. Screens, cools, aerates and tempers sand. Magnetically separates metal. Adds moisture. Returns sand to floor in neat windrows. Easy to operate—low maintenance cost. Send for literature.



STATES ENGINEERING
245 E. Murray St.,
Fort Wayne, Indiana

SAND PREPARATION • MECHANIZATION • PLANT LAYOUT

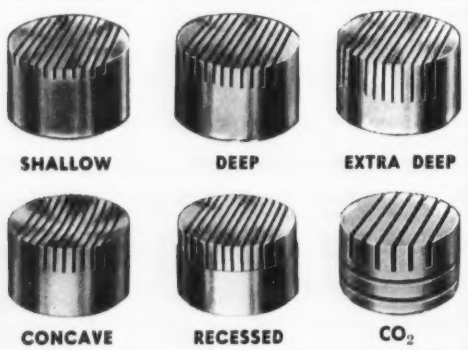
Circle 793 on Page 53

EMPIRE*

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone: ALpine 1-9135
Reg. U. S. Pat. Off.

Circle 794 on Page 53



Slotted core box vents for every purpose. Inserting drill (right) ideal for inserting core vents. Special cleaning tool saves time.

C. M. SMILLIE & COMPANY
1124 WOODWARD HGTS.
FERNDALE 20, MICH.

INSERTING DRILL

CLEANING TOOL

Circle 795 on Page 53

WILSON Pneumatic Horizontal Grinders

Faster grinding... less operator fatigue

Wilson's new Horizontal Grinders speed grinding, buffing, wire wheel work and many other metal removing and finishing operations. Available in various sizes and models, with speeds ranging from 3100 to 12,000 r.p.m. Write for Catalog PT-58.

TW903

THOMAS C. WILSON, INC.
21-11 44th Avenue, Long Island City 1, New York
BETTER TOOLS FOR BETTER WORK

Circle 796 on Page 53

speed up foundry production with

CHASE TURNTABLES

If you need to move or turn heavy materials 45°, 90°, 180° or as much as 360° during your foundry process, consider Chase welded steel turntables for the job. Ideal where hairpin turns must be made, as well as for automatic pouring of permanent mold castings.

Manual or power-driven—roller, caster or ball type available. Diameter and capacity to suit. Any style top—plain, rail, grooved, checkered. Rotating speed of power-driven turntables is flexible.

Write for catalog or send specifications for prompt estimate.

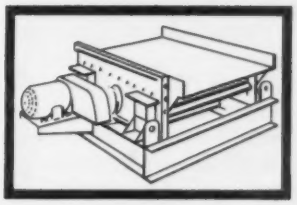
Chase FOUNDRY & MANUFACTURING CO.
2900 Parsons Ave. Columbus 7, Ohio

Circle 797 on Page 53

NON-FLUID OIL
TRADE MARK REGISTERED

Ordinary grease dries out and leaves bearings unprotected

NON-FLUID OIL keeps lubricating indefinitely



NON-FLUID OIL does not lose its lubricating properties even in foundry shake-out and screen operations. It "stays alive" longer in bearings and protects them—despite age, heat and exposure.

Where ordinary greases may pit and discolor ball and roller bearing surfaces, NON-FLUID OIL remains free from acid. It is viscous and clinging and forms a collar of lubricant around the bearing ends to seal out sand and grit. One application usually lasts as long as three applications of other lubricants.

The majority of manufacturers of shake-outs and vibrating screens approve and recommend NON-FLUID OIL as a means of insuring longer bearing life and uninterrupted service.

Bulletin 559 and free testing sample of this remarkable lubricant are yours for the asking.

NEW YORK & NEW JERSEY LUBRICANT COMPANY

292 Madison Ave., New York 17, N. Y.
WORKS: NEWARK, N. J.
WAREHOUSES

Birmingham, Ala.	Charlotte, N.C.	Springfield, Mass.	Providence, R.I.
Atlanta, Ga.	Greenville, S.C.	Greensboro, N.C.	St. Louis, Mo.
Columbus, Ga.	Chicago, Ill.	Detroit, Mich.	

Also represented in principal industrial centers, including Pittsburgh, Pa., Cleveland and Cincinnati, Ohio.

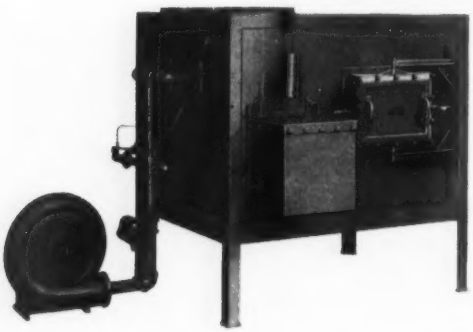
NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So-called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

Circle 798 on Page 53

DFC Furnaces

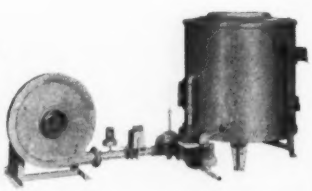
give long, hard service ...increase heat efficiency

1300-lb. capacity— in just 36 sq. ft. of floor space!



REVERB-O-MELTER, reverboratory aluminum melting furnace, available in either stationary or tilting types, gas-fired. Separate charging and ladling buckets allow simultaneous operations, built-in access door for fluxing and puddling. Used for die casting, permanent mold casting, conveyorized production of small sand castings.

Tangential firing— no crucible hot spots!



Rugged crucible and pot type, stationary melting furnace, for melting at temperatures up to 2200° F. in graphite crucibles. Gas or oil fired; adaptable to manual or automotive temperature control as well as flame safety equipment. For melting non-ferrous metals: copper, brass, bronze, gold, silver, etc.

DFC produces a complete line of industrial furnaces designed for simplicity, durability and efficiency.

Denver Fire Clay Company

3033 BLAKE STREET DENVER 17, COLORADO

Please send further information on the following furnaces:

☐ Forge Furnaces ☐ Melting Furnaces ☐ Special Furnaces
☐ Laboratory and Testing Furnaces ☐ Assay Furnaces ☐ Heat Treating Furnaces

DFO-14

Name:.....

Company:.....

Address:.....

City:.....Zone:.....State:.....

SAVE!

On Specially Low Alloyed CAST IRON WELD RODS

CHECK OUR E-Q* BID

Check CHF *ECONOMY-QUALITY bid on your specially Low Alloyed CAST IRON welding rods before you buy! See how much you save—compare the quality. Send your specifications in today. Prompt bid replys!

WRITE TODAY!

Fuse-Well

CAST IRON WELDING RODS OR ELECTRODES

Distributors in All Principal Cities

THE CHICAGO HARDWARE FOUNDRY CO.

Weld Rod Division

NORTH CHICAGO • ILLINOIS

Circle 800 on Page 53

FOUNDRY CONSULTANTS

APPRAISALS . . . WAGE INCENTIVE PLANS . . . COST SYSTEMS . . . EXECUTIVE CONTROL . . METHODS PRODUCTION CONTROL SYSTEMS . . .

PLANT REMODELING . . PLANT DESIGN . . CONTINUOUS SYSTEMS . . . SEMI-CONTINUOUS SYSTEMS . . . PRESENT OPERATION MODERNIZED

EDWIN S. CARMAN, INC.

1645 LEE ROAD CLEVELAND 18, OHIO

Circle 801 on Page 53

NON-FERROUS FOUNDRY METALLURGY

By A. J. Murphy

Covers the general principles unifying foundry techniques of all industrial nonferrous metals in relation to metals in the liquid state to the process of solidification and to the factors influencing properties of casting. Other materials include the part played by gas dissolved in liquid metals, its control and its influence on cast products; factors influencing the grain size of castings, and mechanical properties of castings as complete components compared with the properties in conventional test samples.

497 pages Price $12.50 Postpaid

FOUNDRY Book Dept. 1213 W. 3rd St., Cleveland 13, Ohio

You are invited
to visit us at
Booths 1508 and 1510
at the
1960 AFS CASTINGS CONGRESS and EXPOSITION
Philadelphia, Pa., May 9-13

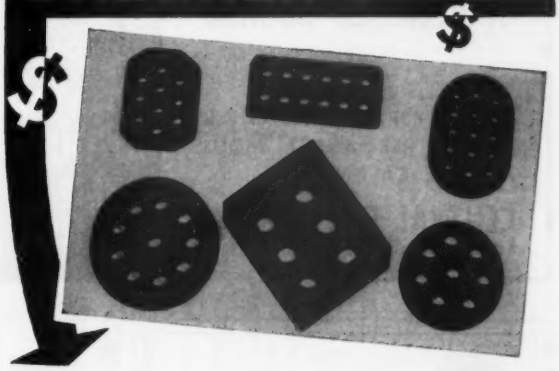
PATTERN MILLING MACHINE
JIG SAW
SAW BENCH
BAND SAW
24" JOINTER
PATTERN LATHE
SANDERS

See these and other "OLIVER" Machines in operation

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

Circle 802 on Page 53

Save Money *with* RUDOW STRAINER CORES



Custom Made • Will Duplicate Your Sample or Drawing • Unlimited Design Range • High Heat Resistance • Extra Hard • Saves Time—Trouble

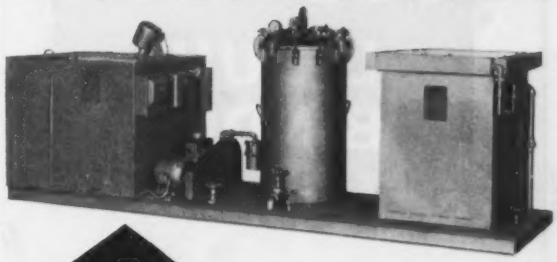
RUDOW quality Strainer Cores cut rejects, cut costs, keep castings free of oxides, slag and impurities—simplify gating control and metal flow, for greater production. We offer you *Free Samples* of RUDOW Strainer Cores—made like your sample, or from your drawing. Write today—or phone MAin 6-1163.

SEND FOR FREE BULLETINS, PRICES ETC.

RUDOW MANUFACTURING CO.
2602 Venice Rd. • P. O. Box 2121 • SANDUSKY, OHIO

Circle 803 on Page 53

CUT REJECTS
OUT OF YOUR COST PICTURE!



MOGUL PACKAGED-UNIT
HIGH VACUUM and PRESSURE IMPREGNATORS

IMPROVE PRODUCT QUALITY

MOGUL means dependable, thorough impregnating with Mogul cast seal or any other impregnating material including polyesters and phenolic resins.

MOGUL, because of extremely high vacuum, removes air and moisture for positive penetration of impregnant into parts. Following this vacuum action, applied pressure then assures still greater coverage and impregnation.

CHECK THESE MOGUL ADVANTAGES:

- **COMBINATION high vaccum and pressure**
- **VERSATILE sizes and ranges: 2 to 100 cu. ft. as standard models 29" or more vacuum, 100 lbs. pressure**
- **THERMOSTATIC CONTROLS**

PLUS:

READY-ASSEMBLED INSTALLATIONS that save work, time and cost

Just hook up complete packaged unit to your utilities and start operation!

ASK ABOUT MOGUL CUSTOM DESIGNING & BUILDING

Phone SAcramento 2-3710 — or write

METALLIZING COMPANY OF AMERICA, INC.
3520 W. Carroll Avenue, Chicago 24, Illinois

Circle 804 on Page 53

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

ROBESON PROCESS COMPANY

(Established 1905)

GENERAL OFFICES AND PLANT: • ERIE, PA.

Circle 805 on Page 53

INSPECTION PROBLEMS?
This booklet is for you!

This comprehensive, elaborately illustrated booklet provides practical information on the use of the famous A. C. M. I. Borescope in various industries, for the inspection of interior areas or surfaces not otherwise visible—together with full data on the types of Borescope available, and on their care and maintenance. Have you received your copy?

Free on request — *Fill in and mail today*

To *American Cystoscope Makers, Inc.*
8 PELHAM PARKWAY PELHAM MANOR, N. Y.

Gentlemen: Please send me without obligation a copy of your booklet on Borescopes.

Name_____

Firm_____

Address_____

City_____ State_____

Circle 806 on Page 53

SINCE 1919
A RELIABLE SOURCE
of

QUALITY PATTERNS, SHELL MOLDS, PERMANENT MOLDS AND DIE CASTING DIES.

CENTRAL PATTERN CO.
QUINCY, ILL. TELEPHONE: BA 2-0947

40th YEAR AT THE SAME STAND

Circle 807 on Page 53

.....A Wheel Dresser that's safe and comfortable to use

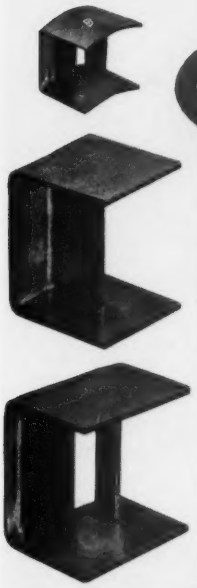
Also longer lasting with six sets of bearings in each handle, plus extra high carbon steel cutters hardened all the way through for much longer life. Write for "Dresser Guide", furnishing selection information.

MACHINE PRODUCTS CORP.
127 HOLLIER AVE., DAYTON 3, OHIO

Circle 808 on Page 53

WHY POUR YOUR PROFITS AWAY?

save up to 50% on chaplets



Buffalo
ECONOMY CHAPLETS

Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

Furnished in a complete line of sizes and gauges, Buffalo Economy Chaplets are available in tinned steel, Monel, stainless steel and copper. Why not give them a trial? It costs only pennies to find out how many dollars you will save.

Write for literature on Economy Chaplets. For information on the complete "Buffalo" line, request Catalog No. 20.

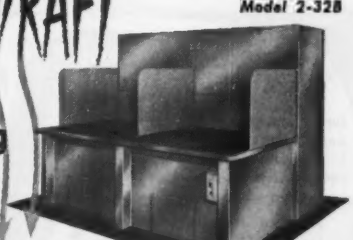
MANUFACTURED BY
Combined SUPPLY & EQUIPMENT CO., INC.
211 Chandler St. Buffalo 7, N. Y.

Circle 809 on Page 53

keep air CLEAN in grinding rooms with *famous* WOLVERINE DOWN DRAFT dust collecting benches

Downward streams of air, with velocities from 300 to 800 feet per minute, as operation requires, pulled through open grating working surface drive dust from grinding, polishing and sanding into rear compartment. There the dust is removed by heavy duty viscous filter. An axial flow fan at top exhausts cleaned air vertically to room or thru duct to outside if required. The perfect dust collecting and air cleaning system for grinding, polishing and sanding operations.

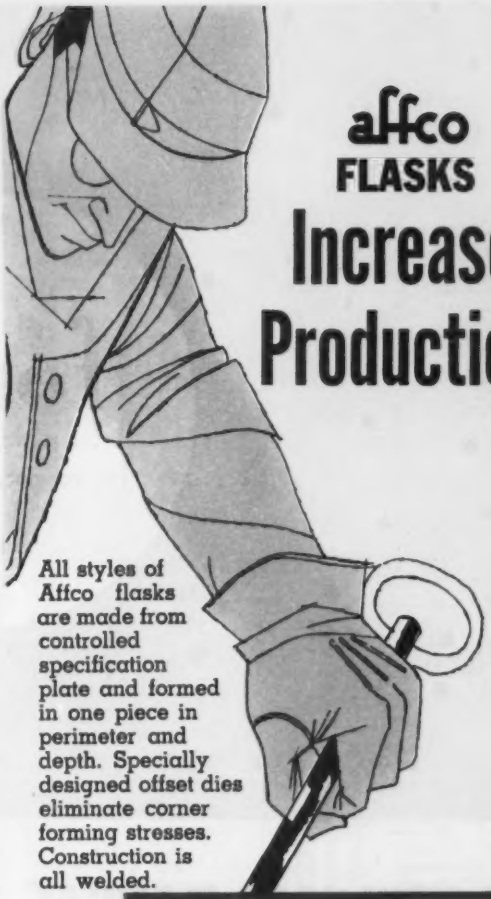
Type B
Model 2-328



WOLVERINE EQUIPMENT CO.
31 MAIN STREET, CAMBRIDGE 42, MASS.

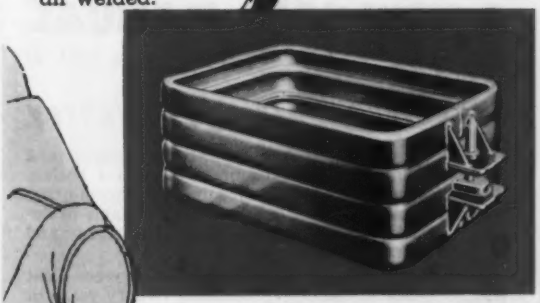
Write for bulletin describing the Wolverine Standard (above) and new Turntable Down Draft Dust Collecting Benches. Dept. F.

Circle 810 on Page 53



affco FLASKS Increase Production

All styles of Affco flasks are made from controlled specification plate and formed in one piece in perimeter and depth. Specially designed offset dies eliminate corner forming stresses. Construction is all welded.



American Style FP-14C flask, with Style B combination pinlug and handle, is lighter in actual handling weight and is the answer for one-man handling. Fabricated from 3/16" steel, utmost rigidity is assured by our inside corrugation and 3/8" sand-strip provides good bearing.

Prompt service on all quotations and orders. Visit our booth #410 at the A. F. S. Exposition.

affco AMERICAN FOUNDRY FLASK COMPANY
2745 Southwest Boulevard • Kansas City 8, Missouri
DIVISION OF CROMB & GAGEL, INC.

Circle 811 on Page 53

force

. . . power to persuade or convince.

(see page 69)

A NEW COST MANUAL

for the

Gray Iron Castings Industry

(NO. 2)

Here in 120 carefully planned pages is a complete Cost Account System for both a small foundry with minimum accounting facilities and a large foundry capable of detailed cost determinations for accuracy and completeness.

Price $10.00 Postpaid

Two cost manuals under one cover—Cost Manual No. 1, representing twenty years of editing and revising by practical operating experts in the industry, is included as a supplement.

The more thorough treatment of the subject found in the new manual was dictated by the considerations of economy in dealing with the higher priced labor and material factors and a relentless desire to probe for hidden costs from wasteful and nonprofitable activities.

GET YOUR NEW COMPLETE COST SYSTEM FOR FOUNDRIES

FOUNDRY, Book Dept., 1213 W. 3rd St.
Cleveland 13, Ohio Date_____

Please forward one copy of COST MANUAL NO. 2, at $10.00 postpaid. ☐ Check enclosed.

NAME _____

ADDRESS _____

CITY _____ STATE _____

Orders for delivery in Ohio—add 3% sales tax.

NCP makes effective PATTERN LACQUERS

1. Seals patterns to prevent moisture and water absorption.
2. Brushes easily—dries quickly.
3. Does not chip, peel, bubble, or blister, and is flexible.
4. Adds slip, promoting clean parting of pattern from sand.
5. Made in all colors.
6. Time tested material—successfully used in pattern shops all over the country for over 30 years.

The National Chemical & Plastics Co.
1424 Philpot Street Baltimore 31, Maryland

Circle 813 on Page 53

BRASS & BRONZE FOUNDRY PRACTICE

By Harry M. St. John

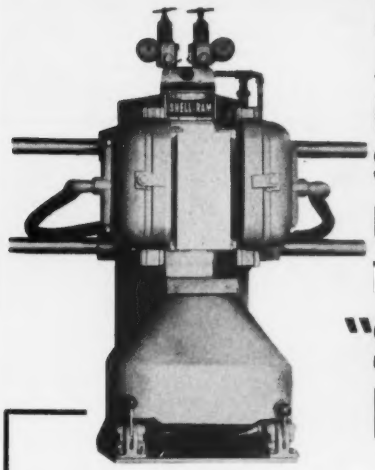
The 250 pages of this book covers the entire range of brass foundry operations. The text is supplemented by 95 illustrations which clarify and enlarge on the subject matter. A complete index expands the usefulness of the book as a reference work.

6 x 9 Cloth Bound Price $8.00 | **FOUNDRY Book Department 1213 W. 3rd St., Cleveland 13, Ohio**

MURPHY
PISTOL
SPRAYER
Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.
Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .
2673
JAMCO
JAS. A. MURPHY & CO., INC.
1425 EAST HIGH STREET, HAMILTON, OHIO

Circle 812 on Page 53

Circle 814 on Page 53



AT LAST!
A BENCH MODEL SHELL CORE MACHINE.... THE "SHELL-RAM"

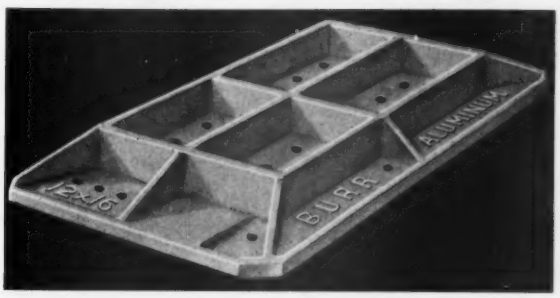
The "SHELL-RAM" uses gas fired radiant heat. Bottom blow is semi-automatic. It is so adaptable, it can use many of your present aluminum core boxes. Only seconds are required to change a core box. Cores made by this bench model "SHELL-RAM" are ready to use in less than 1 minute. For further information, call or write:

A.C. CHRIS COMPANY

9007 S. ASHLAND AVE. CHICAGO 20, ILL. BEVERLY 3-1588

Circle 815 on Page 53

BURR ALUMINUM BOTTOM BOARDS IMPROVE CASTING QUALITY



STURDIEST POSSIBLE MOLD FOUNDATION

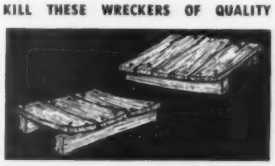
- Can't Warp, Swell, Twist, Burn or Come Apart
- Eliminates Cracked Molds—reduces rejects
- Strong—Rigidly Bridged—Lightweight—One Piece

Better castings are produced on Burr Aluminum Bottom Boards with fewer rejects caused by cracked molds, swells and inadequate venting.

KILL THESE WRECKERS OF QUALITY

240 STOCK SIZES assures QUICK DELIVERY

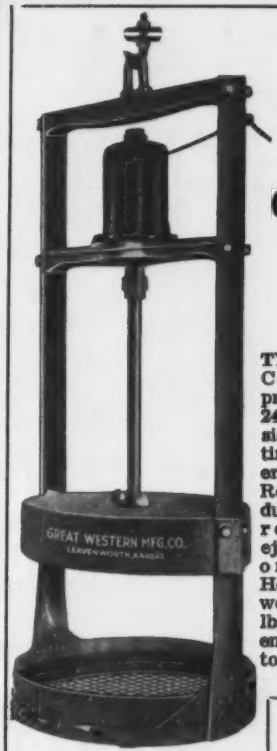
Write Today for prices



BURR ALUMINUM PRODUCTS

P. O. BOX 61 BURR OAK, MICHIGAN

Circle 816 on Page 53

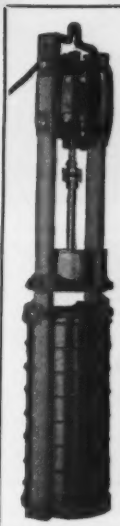


RUGGED SCREEN-ABILITY!
COMBS GYRATORY RIDDLES

"Greatest Name in Motion"

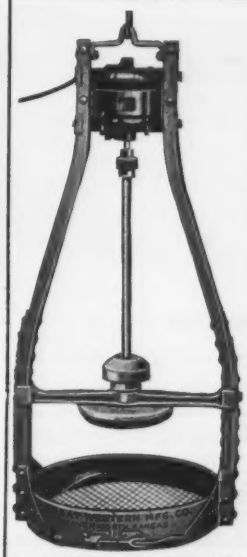
TYPE "CS". Complete price $395.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs, ½ H.P. enclosed motor.

TYPE "CR". Complete price $385.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., 1/3 H.P. enclosed motor.



TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

PROMPT DELIVERY from your Foundry Supply House



TYPE "V". Price, 20" Sieve, $300.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. Height 4'6", weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $545.00.

MAIL THE COUPON NOW!

GREAT WESTERN MFG. CO.

Leavenworth, Kansas Phone MU-22291

☐ Send Additional FREE Information

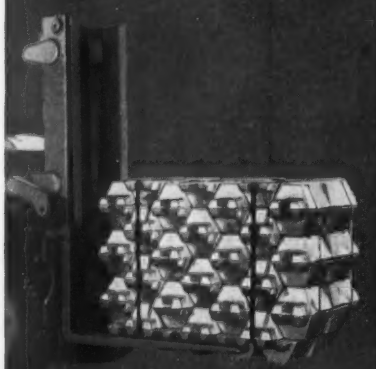
NAME

ADDRESS

CITY STATE

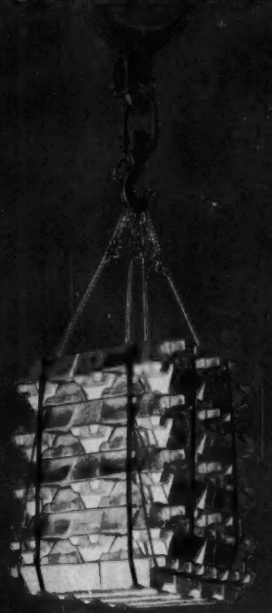
Circle 817 on Page 53

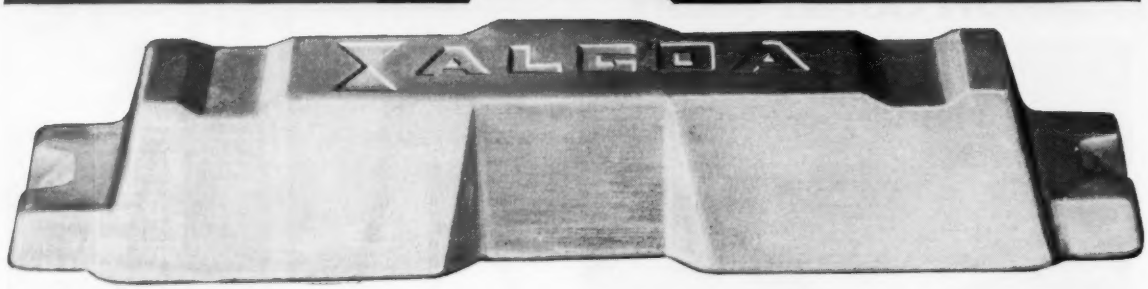
Alcoa's new low-silhouette parallel-stacked bundle provides the answer to small furnace-door openings for users who charge whole bundles at a time. Only 30 in. high, this bundle contains 47 pigs and weighs 2,350 lb . . . yet, thanks to Alcoa's new interlocking pig and four steel straps, it's just as safe and easy to handle as the standard bundle.



ALCOA ANNOUNCES A NEW 50-POUND INTERLOCKING PIG

Standard bundles of Alcoa's new 50-lb interlocking pig are cross-stacked and look like this . . . when we ship them and when you get them. Made up of 44 pigs in a 2,200-lb package, bundles are designed for fork truck handling, but are stable enough for transfer with crane and slings.





...DESIGNED TO CUT YOUR HANDLING COSTS

Alcoa, the company that pioneered steel-tied bundles for aluminum pig and ingot, has now come up with a better bundle. Thanks to a new interlocking feature and other design changes cast into Alcoa's 50-lb pig, bundles are tighter and more compact. Pigs can't be jarred out of position in shipment. You'll move bundles out of the railroad car or truck trailer faster, move them through your plant with greater speed and safety, then stack them higher. And these benefits, as every operating man knows, add up to real economies.

In its continuing effort to satisfy all customer needs, Alcoa spent several years consulting with customers and testing bundles under every conceivable condition. The design finally adapted incorporates a simple side-to-side locking device. Strapping, too, underwent exhaustive testing both in the laboratory and under actual shipping and foundry conditions. Two straps were found to be barely adequate, three better, and four best . . . for maximum safety and stability. Alcoa's 50-lb pig will all be bundled with four steel straps.

Available in either of the two bundles illustrated, Alcoa's new interlocking pig may also be ordered for shipment in polyethylene bags if desired. For full details and your free copy of Alcoa's new booklet listing all grades and alloys in pig and ingot form, contact your local Alcoa sales office or write: Aluminum Company of America, 2115-E Alcoa Building, Pittsburgh 19, Pa. World-wide sales through Alcoa International, Inc., 230 Park Avenue, New York 17, N.Y.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

WHERE-TO-BUY

The following list classifies the foundry equipment, materials and services offered to the industry by the advertisers of FOUNDRY

ABRASIVE (Brick and Files)

Bay State Abrasive Products Co.
Westboro, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
Macklin Co.
Jackson, Mich.
Norton Co.
Worcester 6, Mass.
Peninsular Grinding Wheel Co.
729 Book Bldg.
Detroit 7, Mich.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.

ABRASIVE (Metallic) — See SHOT and GRIT

ABRASIVE BELTS

Abrasive Products, Inc.
South Braintree, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Minnesota Mining & Mfg. Co.
900 Fauquier St.
St. Paul, Minn.

ABRASIVE CLOTH and PAPER

Abrasive Products, Inc.
South Braintree, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Minnesota Mining & Mfg. Co.
900 Fauquier St.
St. Paul, Minn.

ABRASIVE WHEELS—See GRINDING WHEELS

ACCELERATORS (Mold and Core Binder)

Hayden Newport Chemical Corp.
342 Madison Ave.
New York 17, N. Y.
Reichhold Chemicals, Inc.
525 North Broadway
White Plains, N. Y.

ACETYLENE—See GAS

ACOUSTICAL MATERIALS & EQUIPMENT

George Koch Sons, Inc.
10 South 11th St.
Evansville 12, Ind.

AERATORS — See SAND PREPARATION EQUIPMENT

AFTERCOOLERS (Compressed Air)

Carrier Conveyor Div.
Chain Belt Co.
211 N. Jackson St.
Louisville 2, Ky.
Ingersoll-Rand Co.
11 Brodway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
James A. Murphy & Co.
Hamilton, Ohio.

AIR CONTROL EQUIPMENT

Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Texas.
Foxboro Company
Foxboro, Mass.
Hunt Valve Co.
1913 East State St.
Salem, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Ross Operating Valve Co.
120 East Golden Gate
Detroit 3, Mich.
Valvair Div.
International Basic Economy Corp.
P.O. Box 631
Akron 9, Ohio.

AIRLESS BLAST CLEANING—See BLAST CLEANING EQUIPMENT

ALLOYS—(See type of metal)

ALUMINUM and ALUMINUM ALLOYS and INGOTS

Alloys & Chemicals Mfg. Co., Inc.
4365 Bradley Rd.
Cleveland 9, Ohio.
Aluminum Co. of America
30 Mellon Square
Pittsburgh 19, Pa.
Aluminium Ltd. Sales, Inc.
630 Fifth Ave.
New York 20, N. Y.
Federated Metals Division
American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.
Wm. F. Jobbins Co.
Aurora, Ill.
Kaiser Aluminum & Sales Inc.
300 Lakeside Dr.
Oakland 12, Calif.
Olin Mathieson Chemical Corp.
400 Park Ave.
New York, N. Y.
Reynolds Metals Co.
Richmond 18, Va.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

ANNEALING—See FURNACES (Heat Treating and Annealing)

ANTI-PIPING COMPOUNDS — See EXOTHERMIC COMPOUNDS

ARGON—See GAS

ASSOCIATIONS

Crucible Manufacturers Association
11 W. 42nd St.
New York 36, N. Y.
Foundry Educational Foundation
Terminal Tower Bldg.
Cleveland 13, Ohio.

BAND SAWS—See SAWS

BANDS (Snap Flask)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.

BARS (Steel)

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.

BASKETS (Annealing)

Pressed Steel Co.
Wilkes-Barre, Pa.

BEARINGS (Anti-Friction, Roller and Ball)

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Timken Roller Bearing Co.
Canton 6, Ohio.

BEARINGS (Sintered Bronze)

United States Graphite Co.
Saginaw, Mich.

BELTING (Conveyor, Elevator, Power Transmission)

B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Imperial Belting Co.
1750 S. Kilbourne
Chicago 23, Ill.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Passaic, N. J.
United States Rubber Co.
1230 Ave. of Americas
New York 20, N. Y.

BENTONITE—See CLAY (Bonding)

BINDERS, CORE (Air Setting)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
G. E. Smith, Inc.
246 Washington Road
Pittsburgh 16, Pa.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

BINDERS, CORE (Cereal)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Chemicals Inc.
Sub. National Lead Co.
P. O. Box 1675
Houston 2, Tex.
Corn Products Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Robeson Process Co.
P.O. Box 960
Erie, Pa.

BINDERS, CORE and MOLD (Oil)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Chemical Inc
Sub. National Lead Co.
P. O. Box 1675
Houston 2, Tex.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Hercules Powder Co.
Wilmington 99, Del.
Penola Oil Co.
14300 McNichols Road, West
Detroit 35, Mich.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Frederic B. Stevens, Inc.
16th & Vernor Highway
Detroit 16, Mich.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
United Oil Mfg. Co.
Erie, Pa.

BINDERS, CORE (Pitch)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Penn-Ritton Co.
324 W. 23rd St.
New York 11, N. Y.
Frederic B. Stevens, Inc.
16th & Vernor Highway
Detroit 16, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

BINDERS, CORE and MOLD (Resin)

American Marietta Co.
3400 13th Ave., Southwest
Seattle 4, Wash.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
The Borden Company
350 Madison Ave.
New York 17, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Durez Plastics Div., Hooker Chemical Corp.
1011 Walck Rd.
North Tonawanda, N. Y.
B. F. Goorich Chemical Co.
3135 Euclid Ave.
Cleveland 15, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
Union Carbide Plastics Co.
30 E. 42nd St.
New York 17, N. Y.
United Oil Mfg. Co.
Erie, Pa.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

BINDERS, CORE and MOLD (Sodium Silicate)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.

FREE COPIES

of this section are available for your files. Circle item No. 880 on page 53.

E. I. Du Pont de Nemours & Co. Inc.
Wilmington 98, Del.
Eastern Clay Products Dept., International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Foundry Rubber Inc.
5200 River Road
Washington 16, D. C.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
United Oil Mfg. Co.
Erie, Pa.

BINS and GATES (Bulk Materials Storage)

American Bridge Div.
United States Steel Corp.
525 Wm. Penn Place
Pittsburgh 19, Pa.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Nomad Equipment Corp.
3110 West Fond du Lac Ave.
Milwaukee 10, Wis.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Webster Mfg. Co.
Tiffin, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 West Fond du Lac Ave.
Milwaukee 10, Wis.

BLACKING (Mold, Core)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
United States Graphite Co.
Saginaw, Mich.

BLADES (Shot Blast Equipment)

Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

BLAST CLEANING EQUIPMENT (Airless or Pneumatic)

Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Walker Pump Co.
546 Eleventh St.
Brooklyn, N. Y.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

BLAST CLEANING EQUIPMENT (Hydraulic)

Hydro-Blast Div.
Guardite Co. Div. of
American Marietta Co.
Wheeling, Ill.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.

BLOWERS (Furnace)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
American Air Filter Co.
266 Central Ave.
Louisville 8, Ky.
Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Campbell-Hausfeld Co.
Harrison, Ohio.
Ingersoll-Rand Co.
11 Broadway
New York, N. Y.
Johnston Mfg. Co.
Minneapolis 13, Minn.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Spencer Turbine Co.
Hartford, Conn.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

BLOWPLATES (Core and Mold)

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

BOARDS (Presser)

Adams Co.
Dubuque, Iowa.

BOARDS and PLATES (Bottom)

Adams Co.
Dubuque Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Burr Aluminum Products
Burr Oak, Mich.
Foundries Materials Co.
Coldwater, Mich.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Nomad Equipment Corp.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

BOND CLAY—See CLAY (Bonding)

BOOKS (Technical)

Penton Publishing Co.
1213 W. 3rd St.
Cleveland 13, Ohio.

BOWLS and SHANKS

Industrial Equipment Co.
Minster, Ohio.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

BOXES (Stacking, Tote)

Kirk & Blum Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

BRASS and BRONZE INGOTS

Federated Metals Div. of American Smelting & Refining Co.
120 Broadway
New York 5, N. Y.

BRIQUETS—See Type of Compound

BRIQUETTING MACHINES

Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.

BRUSHES (Bristle)

Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.

BRUSHES (Electrical)

United States Graphite Co.
Saginaw, Mich.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Blaw-Knox Co.
Blawnox, Pa.
Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Great Western Mfg. Co.
Leavenworth, Kans.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Penn Iron Works, Inc.
Reading, Pa.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Shell Process, Inc.
Bliss & Parkside St.
West Springfield, Mass.
Stephens-Adamson Mfg.
Aurora, Ill.
Webster Mfg. Co.
Tiffin, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.
Whirl-Air-Flow Corp.
650 25th Ave. S. E.
Minneapolis 14, Minn.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

BUILDING and ENGINEERING SERVICE

American Bridge Div.
United States Steel Corp.
525 Wm. Penn Place
Pittsburgh 19, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

E. W. Bliss Co.
1375 Raff Rd., Southwest
Canton 10, Ohio.
Johnston Mfg. Co.
Minneapolis 13, Minn.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

BUSHINGS — See FLASK BUSHINGS, PINS, and FITTINGS

BUTTS (Sand Rammer)

Arrow Butt Co.
4800 W. 139th St.
Cleveland 35, Ohio.

CALCIUM ALLOYS

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

CAR MOVERS

Frank G. Hough Co.
703 Sunnyside Ave.
Libertyville, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Webster Mfg. Co.
Tiffin, Ohio.

CARBON BOOSTER

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Becker Bros. Carbon Co.
3450 South Laramie
Cicero, Ill.
Great Lakes Carbon Corp.
579 Fifth Ave.
New York 36, N. Y.
National Carbon Co., Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.

CARBON DIOXIDE — See GAS

CARS (Core, Mold, Heat Treating Oven)

Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
International Clay Machine Co.
Erie, Pa.

CASTING GRIPS (Air Powered)

Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Machine Co.
Tulsa, Okla.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
Taccone Pneumatic
Fdry. Equipment Co.
P. O. Box 468
North East, Pa.

CASTING MACHINES (Die)

Cuyahoga Industries
17920 Waterloo Rd.
Cleveland 19, Ohio.
Kux Machine Co.
6725 North Ridge Ave.
Chicago 26, Ill.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co.
Tulsa, Okla.
Permanent Mold Die Co.
2275 East 9 Mile Rd.
Hazel Park, Mich.
Taccone Pneumatic
Fdry. Equipment Co.
P. O. Box 468
North East, Pa.

CASTING MACHINES (Pig)

Bailey, Wm., Co.
Pittsburgh 16, Pa.

CASTING SEALER—See IMPREGNATING SYSTEMS

CASTINGS

Acme Foundry Co.
2503—22nd St.
Detroit 16, Mich.
Link-Belt Company
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Webster Mfg. Co.
Tiffin, Ohio.

CEMENT (Metallic)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Smooth-On Mfg. Co.
570 Communipaw Ave.
Jersey City 4, N. J.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

CEMENT (Refractory)

Babcock & Wilcox Co.
161 E. 42nd St.
New York 17, N. Y.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Ironton Fire Brick Co.
Ironton, Ohio.
Kaiser Refractories and Chemical Div.
300 Lakeside Drive
Oakland 12, Calif.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
North American Refractories Co.
E. 6th National City Bank Bldg.
Cleveland 14, Ohio.
Norton Co.
Worcester 6, Mass.
Chas. Taylor Sons Co.
710 Burns St.
Cincinnati 4, Ohio.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.

American Chain Div.
American Chain & Cable Co. Inc.
York, Pa.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Great Western Mfg. Co.
Leavenworth, Kans.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Sterling National Industries Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Webster Mfg. Co.
Tiffin, Ohio.

CHAPLETS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cleveland Chaplet & Mfg. Co.
26470 Lakeland Blvd.
Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Fanner Mfg. Co.
Brookside Park
Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co.
1023 S. 40th St.
Milwaukee 4, Wis.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

CHARGING MACHINES (Cupola)

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Modern Equipment Co.
Port Washington, Wis.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Shepard-Niles Crane & Hoist Corp.
360 Schuyler Ave.
Montour Falls, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CHEMICALS

General Chemical Division
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.
B. F. Goodrich Chemical Co.
3135 Euclid Ave.
Cleveland 15, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Olin Mathieson Chemical Corp.
400 Park Ave.
New York, N. Y.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.

CHILLS

Cleveland Chaplet & Mfg. Co.
26470 Lakeland Blvd.
Cleveland 23, Ohio.
Combined Supply & Equipment Co. Inc.
215 Chandler St.
Buffalo 7, N. Y.
Fanner Mfg. Co.
Brookside Park
Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co.
1023 S. Fourth St.
Milwaukee 4, Wis.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Standard Horse Nail Corp.
New Brighton, Pa.

CHILL COATINGS

Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.

CHIPPERS—See PNEUMATIC TOOLS

CHROMIUM (Briquets)

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 6, N. Y.

CLAMPS (Flask)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

CLAY (Bonding)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Chemicals Inc.
Sub. National Lead Co.
P. O. Box 1675
Houston 2, Tex.
Cedar Heights Clay Co.
Oak Hill, Ohio.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Illinois Clay Products Co.
Joliet, Ill.
Ironton Fire Brick Co.
Ironton, Ohio.
Magnet Cove Barium Corp.
3403 Buffalo Speedway
Houston, Tex.
North American Refractories Co.
E. 6th National City Bank Bldg.
Cleveland 14, Ohio.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING COMPOUNDS

Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.

COKE (Oven)

Alabama By-Products Corp.
P. O. Box 354
Birmingham 1, Ala.
DeBardeleben Coal Corp.
2201 First Ave. N.
Birmingham 3, Ala.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Koppers Co., Inc.
Kearny, N. J.
Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co.
Grant Bldg.
Pittsburgh 19, Pa.
Semet Solvay Div.
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.

COMPRESSORS (Air)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Atlas Copco
545 Fifth Ave.
New York 17, N. Y.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Curtis Pneumatic Machinery Div.
Curtis Mfg. Co.
1905 Kienlen Ave.
St. Louis 20, Mo.
Davey Compressor Co.
Kent, Ohio.
Gardner-Denver Co.
Gardner Drive
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Schramm, Inc.
West Chester, Pa.
Spencer Turbine Co.
Hartford, Conn.

CONTROL EQUIPMENT (Cupola)

Foxboro Company
Foxboro, Mass.

CONTROLLERS (Magnet)

Ohio Electric Mfg. Co.
5400 Dunham Rd.
Maple Heights, Ohio.

CONVERTERS (Bessemer)

Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

CONVEYOR DESIGN

Ajax Flexible Coupling Co, Inc.
Westfield, N. Y.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Webster Mfg. Co.
Tiffin, Ohio.

CONVEYORS (Chain)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Richards-Wilcox Mfg. Co.
174 Third St.
Aurora, Ill.
Standard Conveyor Co.
North St. Paul 9, Minn.
Webster Mfg. Co.
Tiffin, Ohio.

CONVEYORS (Fabric, Rubber Belt)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Canada.
B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Imperial Belting Co.
1750 S. Kilbourne
Chicago 23, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Nomad Equipment Corp.
3110 West Fond du Lac
Milwaukee 10, Wis.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Standard Conveyor Co.
North St. Paul 9, Minn.
Stephens-Adamson Mfg. Co.
Aurora, Ill.

United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.
Webster Mfg. Co.
Tiffin, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

CONVEYORS (Gravity Roller)

F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Standard Conveyor Co.
North St. Paul 9, Minn.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

CONVEYOR (Live Roller)

F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Canada.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Standard Conveyor Co.
North St. Paul 9, Minn.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

CONVEYORS (Mold)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Nomad Equipment Corp.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Taconne Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Webster Mfg. Co.
Tiffin, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

CONVEYORS (Overhead Monorail.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Penn Iron Works Inc.
Reading, Pa.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Richards-Wilcox Mfg. Co.
174 Third St.
Aurora, Ill.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CONVEYORS (Pneumatic)

National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Spencer Turbine Co.
Hartford, Conn.
Whirl Air Flow Corp.
650—25th Ave. S.E.
Minneapolis 14, Minn.

CONVEYORS (Portable)

C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Carrier Conveyor Div.
Chain Belt Co.
211 N. Jackson St.
Louisville 2, Ky.
Cleveland Vibrator Co.
2828 Clinton Ave. W.
Cleveland 13, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Simplicity Engineering Co.
Durand, Mich.
Stephens-Adams Mfg. Co.
Aurora, Ill.

COPPER and COPPER SHOT

Alloy Metal Products, Inc.
Rockingham Rd.
Davenport, Iowa.
Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Martin Engineering Co.
Neponset, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Demmler Mfg. Co.
Kewanee, Ill.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
International Molding Machine Co.
LaGrange Park, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Redford Iron & Equipment Co.
20733 Glendale Ave.
Detroit 23, Mich
Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

COREBOXES

Accurate Match Plate Co.
1847 W. Carroll Ave.
Chicago, Ill.
Central Pattern Co.
Quincy, Ill.

CORE DRAWING MACHINES—See STRIPPING, DRAWING and ROLLOVER MACHINES

COREMAKING MACHINES

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Hansberg Shooters, Inc.
3213 Central
Evanston, Ill.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
International Molding Machine Co.
LaGrange Park, Ill.
Johnston & Jennings Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Redford Iron & Equipment Co.
20733 Glendale Ave.
Detroit 23, Mich.
SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.
Shell Process Inc.
Bliss & Parkside Sts.
West Springfield, Mass.
Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.
Tabor Mfg. Co., Div.
Turbo Machine Co.
Lansdale, Pa.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

CORES (Strainer, Riser, Breakoff)

Ferro Corp.
Louthan Div.
East Liverpool, Ohio.
Rudow Mfg. Co.
2602 Venice Rd.
Sandusky, Ohio.
Universal Clay Products
Sandusky, Ohio.

CORE SHOOTING MACHINES

Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
Hansberg Shooters, Inc.
3213 Central
Evanston, Ill.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

CORE TESTING EQUIPMENT

Detroit Testing Machine Co.
9390 Grinnell Ave.
Detroit 13, Mich.
Harry W. Dietert Co.
9330 A Roselawn Ave.
Detroit 4, Mich.
Claud S. Gordon Co.
3000 S. Wallace
Chicago 16, Ill.

COUNTERS (Casting, Cores, Molds)

Hartley Controls Corp.
P. O. Box 290
Neenah, Wis.

COUPLINGS (Air, Hydraulic)

Airetool Mfg. Co.
Springfield, Ohio.
Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Tex.
B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Hunt Valve Co.
1913 East State St.
Salem, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

COVERS (Annealing)

Pressed Steel Co.
Wilkes-Barre, Pa.
Webster Mfg. Co.
Tiffin, Ohio.

CRANES (Bucket)

Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Jib)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.

Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp.
360 Schuyler Ave.
Montour Falls, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Self-Propelled)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Manning-Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Stacker)

All State Engineering Co.
7050 North 76th St.
Milwaukee 18, Wis.

CRUCIBLES

Ajax Magnethermic Corp.
3990 Simon Rd.
Youngstown 1, Ohio.
American Refractories & Crucible Corp.
North Haven, Conn.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Crucible Manufacturers Association
11 W. 42nd St.
New York 36, N. Y.
Dixon, Joseph, Crucible Co.
Jersey City 3, N. J.
Electro Refractories & Abrasives Corp.
Vars Bldg.
Buffalo 2, N. Y.
Great Lakes Carbon Co.
18 E. 48th St.
New York 17, N. Y.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Lava Crucible Co.
Pittsburgh, Pa.
National Carbon Co., Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Ross-Tacony Crucible Co.
Tacony Philadelphia, Pa.
Vesuvius Crucible Co.
Swissvale, Pa.

CRUSHERS (Core)

Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Simplicity Engineering Co.
Durand, Mich.

CUPOLAS

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUTOFF MACHINES (Abrasive)

DoAll Co.
Des Plaines, Ill.
Fox Grinders Inc.
Oliver Bldg.
Pittsburgh, Pa.
A. P. Green Fire Brick Co.
Mexico, Mo.
Tabor Mfg. Co., Div. Turbo Machine Co.
Lansdale, Pa.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

CUTOFF WHEELS

Bay State Abrasive Products Co.
Westboro, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Cincinnati Milling Products Div.
4701 Marburg Ave.
Cincinnati 9, Ohio.
A. P. Green Fire Brick Co.
Mexico, Mo.
Macklin Company
Jackson, Mich.
Norton Company
Worcester 6, Mass.
Raybestos-Manhattan, Inc.
Manhattan Rubber Division
Passaic, N. J.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.
Union Carbide Metals Co., Div. of Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

CYLINDERS (Air)

Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Tomkins-Johnson Co.
2425 West Michigan Ave.
Jackson, Mich.

CYLINDERS (Hydraulic)

Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Tomkins-Johnson Co.
2425 West Michigan Ave.
Jackson, Mich.

DEGASIFIERS and DEOXIDIZERS

Carborundum Co.
Niagara Falls, N. Y.
Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Lithium Corp. of America Inc.
Rand Tower
Minneapolis 2, Minn.
National Pigment Co.
Orthodox St. at Delaware River
Philadelphia 39, Pa.
Pittsburgh Metals Purifying Co.
P. O. Box 568
Mars, Pa.
Whitehead Metals Inc.
303 West 10th St.
New York 14, N. Y.

DEGASSING EQUIPMENT (Vacuum)

Centrifugal Casting Machine Co.
Tulsa, Okla.

DESIGN TESTING

Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.

DESULPHURIZERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Modern Equipment Co.
Port Washington, Wis.
National Pigment Co.
Orthodox St. at Delaware River
Philadelphia 39, Pa.
Olin Mathieson Chemical Corp.
400 Park Ave.
New York, N. Y.
Pittsburgh Metals Purifying Co.
P. O. Box 568
Mars, Pa.
Whiting Corp.
15607 Lathrop Ave
Harvey, Ill.

DIE BLOCKS (Die Casting)

Tiffin Foundry Co.
West Adams St.
Tiffin, Ohio.

DIES (Diecasting)

Central Pattern Co.
Quincy, Ill.
Detroit Mold Engineering Co.
6686 E. McNichols
Detroit 12, Mich.
Permanent Mold Die Co.
2275 East 9 Mile Rd.
Hazel Park, Mich.

DOORS (Open Hearth)

Bailey, Wm. M., Co.
Pittsburgh 16, Pa.

DOWEL PINS

Standard Horse Nail Corp.
New Brighton, Pa.

DRESSERS (Grinding Wheel)

Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
Desmond-Stephan Mfg. Co.
Urbana, Ohio.
Machine Products Corp.
125 Hollier
Dayton 3, Ohio.
Norton Co.
Worcester, Mass.

DRILLS (Electric)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

DRILLS (Pneumatic)

Airetool Mfg. Co.
Springfield, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Schramm, Inc.
West Chester, Pa.

DRIVES (Gear, Variable Speed)

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DRYERS (Core)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.

DRYERS (Mold)

Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

DRYERS (Sand)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Davenport Machine & Foundry Co.
Davenport, Iowa.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc.
266 Central Ave.
Louisville 8, Ky.
Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo 54, Mich.
Hawley Mfg. Co.
411 North Wabash
Wabash, Ind.
Iron Lung Ventilator Co.
5403 Prospect Ave.
Cleveland 3, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Peabody Engineering Co.
232 Madison Ave.
New York 16, N. Y.
Claude B. Schneible Co.
P. O. Box 296, Roosevelt Park
Detroit 32, Mich.
Standard Electrical Tool Co.
2488 River Road
Cincinnati 4, Ohio.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.
Western Precipitation Corp.
1016 West 9th St.
Los Angeles 15, Calif.
Wheelabrator Corp.
505 S. Byrkit
Mishawaka, Ind.
Wolverine Equipment Co.
31 Main St.
Cambridge 42, Mass.

EDUCATION (Training Course)

American Society for Metals
Metals Park
Novelty, Ohio.

ELECTRODE HOLDERS AND BUS TUBES (Rebuilding Service)

Wilson Welding Company, Inc.
221 High St., Altizer Addition
Huntington, W. Va.

ELECTRODES, FURNACE (Graphite and Amorphous)

Arcair Co.
465 South Mt. Pleasant Ave.
Lancaster, Ohio.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co., Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.

ELECTRODES and RODS (Welding)

Chicago Hardware Foundry Co.
2500 Commonwealth Ave.
North Chicago, Ill.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
International Nickel Co., Inc.
67 Wall St.
New York 5, N. Y.
Linde Co., Div.
Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
National Carbon Co., Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.

Rexarc, Inc.
West Alexandria, Ohio.
United States Graphite Co.
Saginaw, Mich.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

ELEVATORS (Bucket)—See BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

ENGINEERING SERVICE (Foundry)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Edwin S. Carman
1643 Lee Road
Cleveland 18, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Foundry Design Co.
106 S. Hanley Rd.
St. Louis 5, Mo.
International Automation Corp.
Ann Arbor, Mich.
Lester B. Knight & Associates, Inc.
549 W. Randolph St.
Chicago 6, Ill.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Westover Corp.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

EXOTHERMIC COMPOUNDS

Foundry Services Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Pittsburgh Metals Purifying Co.
P. O. Box 568
Mars, Pa.
United States Graphite Co.
Saginaw, Mich.
Whitehead Metals Inc.
303 West 10th St.
New York 14, N. Y.

FABRICATORS (Metal)

Iron Lung Ventilator Co.
5403 Prospect Ave.
Cleveland 3, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
Newaygo Engineering Co.
Newaygo, Mich.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Penn Iron Works, Inc
Reading, Pa.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Roura Iron Works
1404 Woodland Ave.
Detroit 11, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

FACINGS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Delta Oil Products Co.
6263 Cedarbury Rd.
Milwaukee 9, Wis.
Foundry Services Inc.
P. O. Box 8728
Cleveland 35, Ohio.
National Carbon Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Penn-Rilton Co.
324 W. 23rd St.
New York 11, N. Y.
Stevens Inc., Frederic B.
18th & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FEEDERS (Belt)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Webster Mfg. Co.
Tiffin, Ohio.

FEEDERS (Plate)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Great Western Mfg. Co.
Leavenworth, Kans.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Newaygo Engineering Co.
Newaygo, Mich.

FEEDERS (Screw)

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

FEEDERS (Vibrating)

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Carrier Conveyor Div.
Chain Belt Co.
211 N. Jackson St.
Louisville 2, Ky.
Cleveland Vibrator Co.
2828 Clinton Ave. W.
Cleveland 13, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Simplicity Engineering Co.
Durand, Mich.

FERROBORON

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROCHROME

Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROCOLUMBIUM

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROMANGANESE

Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROMOLYBDENUM

Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.

FERROPHOSPHORUS

Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

FERROSILICON

Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROTITANIUM

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROTUNGSTEN

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FERROVANADIUM

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

FILLERS (Flask)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.

FILTERS and SEPARATORS (Compressed air contaminants)

American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
James A. Murphy & Co.
Hamilton, Ohio.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

FIRE BRICK, CLAY, SAND, Stone—See REFRACTORIES

FLASK BUSHINGS, FITTINGS and PINS

Adams Co.
Dubuque, Iowa.
American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City 8, Mo.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Smillie & Co., C. M.
1124 Woodward Hgts. Blvd.
Ferndale 20, Mich.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

FLASKS (Aluminum, Magnesium)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.

FLASKS (Slip)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.

FLASKS (Snap)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Frederic B. Stevens, Inc.
18th & Vernor Highway
Detroit 16, Mich.

FLASKS (Steel)

American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City 8, Mo.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co.
Dubuque, Iowa.

FLOORING (Non-Slip)

Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Norton Co.
Worcester 6, Mass.

FLOUR (Silica)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Ottawa Silica Co.
Ottawa, Ill.
Pennsylvania Pulverizing Co.
140 Stanwix St.
Pittsburgh 22, Pa.
Standard Silica Co.
Ottawa, Ill.
Wedron Silica Co.
135 S. LaSalle St.
Chicago 3, Ill.

FLOUR (Wood, Corncob)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.

FLUXES

Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
General Chemical Division
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
National Pigment Co.
Orthodox St. at Delaware River
Philadelphia 37, Pa.
Olin Mathieson Chemical Corp.
400 Park Ave.
New York, N. Y.
Pittsburgh Metals Purifying Co.
P. O. Box 568
Mars, Pa.
Superflux Mfg. Co.
16125 Cleophus Ave.
Allen Park 10, Mich.

FLUXES (Soldering, Welding and Tinning)

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

FOUNDRY ENGINEERS—See ENGINEERING SERVICE

FURNACES (Air)

Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

FURNACES (Electric Melting)

Ajax Magnethermic Corp.
3990 Simon Rd.
Youngstown, Ohio.
Ajax Engineering Div.
Ajax Magnethermic Corp.
Trenton, N. J.
American Bridge, Div. United States Steel Corp.
525 Wm. Penn Pl.
Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co.
Bay City, Mich.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Lectromelt Furnace Co. Div.
McGraw Edison Co.
P. O. Box 1125
Pittsburgh, Pa.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard St.
Chicago 12, Ill.
Ohio Crankshaft Co.
Tocco Division
4620 E. 71st St.
Cleveland 5, Ohio.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co.
Harrison, Ohio.
Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Denver Fire Clay Co.
2301 Blake St.
Denver 2, Colo.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Johnston Mfg. Co.
Minneapolis 13, Minn.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Reda Pump Co.
Bartlesville, Okla.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
U. S. Smelting Furnace Co.
Belleville, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc.
Philadelphia 23, Pa.
Ajax Magnethermic Corp.
3990 Simon Rd.
Youngstown 1, Ohio.
Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
General Electric Co.
Schenectady, N. Y.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Johnston Mfg. Co.
Minneapolis 13, Minn.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Ohio Crankshaft Co.
Tocco Division
4620 E. 71st St.
Cleveland 5, Ohio.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
Waltz Furnace Co.
1901 Symmes St.
Cincinnati 6, Ohio.
Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

GAGGERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Cardox Corp.
307 North Michigan Ave.
Chicago 1, Ill.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Linde Co.
Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Pure Carbonic Company
Div. Air Reduction Co.
150 E. 42nd St.
New York 17, N. Y.

GASSING SYSTEMS and EQUIPMENT

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Pure Carbonic Company
Div. Air Reduction Co.
150 E. 42nd St.
New York 17, N. Y.

GENERATORS (Acetylene)

Linde Co.
Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Rexarc, Inc.
West Alexandria, Ohio.

GENERATORS (Power)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.

GLOVES — See SAFETY EQUIPMENT

GRAPHITE and GRAPHITE BRIQUETS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Becker Bros. Carbon Co.
3450 South Laramie
Cicero, Ill.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co. Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Stevens, Frederic B., Inc.
18th & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.

GRINDERS (Bench, Disc, Floor, Surface)

Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
DoAll Co.
Des Plaines, Ill.
Fox Grinders Inc.
Oliver Bldg.
Pittsburgh 22, Pa.
Grinding & Polishing
Machinery Corp.
2530 Winthrop Ave.
Indianapolis 5, Ind.
Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo 54, Mich.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Oliver Machinery Co.
Grand Rapids 1, Mich.
Standard Electrical Tool Co.
2488 River Road
Cincinnati 4, Ohio.
Thor Power Tool Co.
Aurora, Ill.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Remington Arms Co.
Bridgeport 2, Conn.
Standard Electrical Tool Co.
2488 River Road
Cincinnati 4, Ohio.
Thor Power Tool Co.
Aurora, Ill.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDERS (Pneumatic Portable)

Airetool Mfg. Co.
Springfield, Ohio.
Aro Equipment Corp.
Bryan, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Texas.
Gardner-Denver Co.
Gardner Drive
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Thor Power Tool Co.
Aurora, Ill.
T. C. Wilson, Inc.
21-11 44th Ave.
Long Island City 1, N. Y.

GRINDERS (Swing Frame)

Fox Grinders, Inc.
Oliver Bldg.
Pittsburgh 22, Pa.
New York, N. Y.
Grinding & Polishing
Machinery Corp.
2530 Winthrop Ave.
Indianapolis 5, Ind.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDING WHEELS

Atlantic Abrasive
South Braintree, Mass.
Bay State Abrasive Products Co.
Westboro, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
Cincinnati Milling Products Div.
4701 Marburg Ave.
Cincinnati 9, Ohio.
Fuller Merrian Co.
70 Water St.
West Haven 16, Conn.
Macklin Co.
Jackson, Mich.
Norton Company
Worcester 6, Mass.
Peninsular Grinding Wheel Co.
729 Book Bldg.
Detroit 7, Mich.
Raybestos-Manhattan, Inc.
Manhattan Rubber Division
Passaic, N. J.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.

Sterling Grinding Wheel Co.
P. O. Box 801
Tiffin, Ohio.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

GRIT—See SHOT and GRIT

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co.
9390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
King Tester Corp.
440 North 13th St.
Philadelphia 23, Pa.
Steel City Testing Machines Inc.
8807 Lyndon
Detroit 38, Mich.

HEAT TREATING ACCESSORIES (Baskets, Boxes, Pots, Racks)

Pressed Steel Co.
Wilkes-Barre, Pa.

HEATERS (High Frequency Electric)

Ajax Magnethermic Corp.
3990 Simon Rd.
Youngstown 1, Ohio.
Inductotherm Corp.
412 Illinois Ave.
Delanco, New Jersey.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 11, Ill.
Ohio Crankshaft Co.
Tocco Div.
4620 E. 71st St.
Cleveland 5, Ohio.

HEATERS (Oven, Space, Unit, Water)

American Air Filter Co. Inc.
266 Central Ave.
Louisville 8, Ky.
Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio.
Modern Equipment Co.
Port Washington, Wis.

HELMETS (Blasting)

American Optical Co.
Southbridge, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
505 S. Byrkit
Mishawaka, Ind.

HELMETS (Welding)

American Optical Co.
Southbridge, Mass.
Chicago 6, Ill.

HOISTS (Air)

Aro Equipment Corp.
Bryan, Ohio.
Atlas Capco
545 Fifth Ave.
New York 17, N. Y.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Curtis Pneumatic Machinery Div.
Curtis Mfg. Co.
1905 Kienlen Ave.
St. Louis 20, Mo.
Duff-Norton Co.
2709 Preble Ave.
Pittsburgh 33, Pa.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Thor Power Tool Co.
Aurora, Ill.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Chain, Hand)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Bartlett & Snow, C. O. Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Electric)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Duff-Norton Co.
2709 Preble Ave.
Pittsburgh 33, Pa.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp.
360 Schuyler Ave.
Montour Falls, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Skip)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Canada.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Webster Mfg. Co.
Tiffin, Ohio.
Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST, COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOPPERS (Dump)

Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Roura Iron Works
1404 Woodland Ave.
Detroit 11, Mich.

HOPPERS (Bulk Storage)—See BINS and GATES

HOSE (Air, Blasting, Water, Gas)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Raybestos-Manhattan, Inc.
Manhattan Rubber Div.
Passaic, N. J.
Schramm, Inc.
West Chester, Pa.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

HOSE FITTINGS and REELS

B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Hunt Valve Co.
1913 East State St.
Salem, Ohio.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

HOT BLAST EQUIPMENT (Cupola)

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Brown Thermal Products Corp.
Sub. Brown Fintube
300 Huron St.
Elyria, Ohio.
Modern Equipment Co.
Fort Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

HYDROSTATIC TESTING EQUIPMENT

Steel City Testing Machines Inc.
8807 Lyndon Ave.
Detroit 38, Mich.

IMPREGNATING SYSTEMS and CASTING SEALER

Hysol Corp.
Olean, N. Y.
Metallizing Co. of America
3520 W. Carroll Ave.
Chicago 24, Ill.
Tousey Varnish Co.
520 W. 25th St.
Chicago 16, Ill.

INGOT MOLDS

Acme Foundry Co.
2503 22nd St.
Detroit 16, Mich.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co. Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.

INGOT—(See type of metal)

INOCULANTS

Carborundum Co.
Niagara Falls, N. Y.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
United States Graphite Co.
Saginaw, Mich.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

INSPECTION EQUIPMENT (Castings)

Allis-Chalmers
1123 S. 70th St.
Milwaukee 14, Wis.
American Cystoscope Makers, Inc.
129 East 78th St.
New York, N. Y.
Branson Instruments, Inc.
Brown House Rd.
Stamford, Conn.
Budd Co.
Nuclear Systems Div.
2950 Roberts Ave.
Philadelphia 29, Pa.
Detroit Testing Machine Co.
9390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Eastman Kodak Co.
Rochester, N. Y.
King Tester Corp.
440 North 13th St.
Philadelphia 23, Pa.
Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.
Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.
Steel City Testing Machines Inc.
8807 Lyndon
Detroit 38, Mich.

INSTALLATION (Foundry Equipment)

F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Canada.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

IRON ORE

Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

IRON OXIDES

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.

IRON, PIG

Hanna Furnace Corp.
Ecorse, Detroit 29, Mich.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co.
Grant Bldg.
Pittsburgh 19, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Whitehead Metals, Inc.
303 West 10th St.
New York 14, N. Y.
Woodward Iron Co.
Woodward, Ala.

IRON, PIG (Silvery)

Hanna Furnace Corp.
Ecorse, Detroit 29, Mich.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

IRON, PIG (Spiegeleisen)

Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

IRON POWDER

Hoeganaes Sponge Iron Corp.
Riverton, N. J.

IRON (Sponge)

Hoeganaes Sponge Iron Corp.
Riverton, N. J.

JACKETS (Mold)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.

KEYS (Machine)

Standard Horse Nail Corp.
New Brighton, Pa.

KNOCKOUT MACHINES (Core)

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.

LABORATORY EQUIPMENT (Chemical)

Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
General Electric X-Ray Co.
4855 West Electric
Milwaukee 1, Wis.
Great Western Mfg. Co.
Leavenworth, Kans.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.

LABORATORY EQUIPMENT (Physical)

Baird-Atomic, Inc.
33 University Rd.
Cambridge 38, Mass.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
General Electric X-Ray Co.
4855 West Electric
Milwaukee 1, Wis.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Norton Co.
Worcester 6, Mass.
Steel City Testing Machines Inc.
8807 Lyndon Ave.
Detroit 38, Mich.

LADLES

Industrial Equipment Co.
Minster, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Spincraft Inc.
4122 W. State St.
Milwaukee 8, Wis.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

LEAD

Federated Metals Div.
American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

LINERS (Shot Blast Equipment)

Pangborn Corporation
1400 Pangborn Blvd.
Hagerstown, Md.

LINING MATERIAL (Rubber)

B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.

LIGHTERS (Cupola)

Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

LITHIUM

Lithium Corp. of America
Rand Tower
Minneapolis 2, Minn.

LOADERS

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Clearfield Machine Co.
Clearfield, Pa.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

LOADERS (Front-End)

Clark Equipment Co.
Construction Machinery Div.
Benton Harbor, Mich.
Clark Equipment Co.
Industrial Truck Div.
Battle Creek, Mich.
Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.
Mead Specialties Co.
4114 North Knox Ave.
Chicago 41, Ill.
Towmotor Corp.
1226 East 152nd St.
Cleveland 10, Ohio.
Tractomotive Corp.
Deerfield, Ill.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

LUBRICANTS

Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
New York & New Jersey
Lubricant Co.
292 Madison Ave.
New York 17, N. Y.
Nopco Chemical Co.
60 Park Place
Newark, N. J.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
United Oil Mfg. Co.
Erie, Pa.
United States Graphite Co.
Saginaw, Mich.

LUBRICATORS (Air Line)

Airetool Mfg. Co.
Springfield, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Tex.
Gardner Denver Co.
Gardner Drive
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.

MAGNESIUM INGOTS

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

MAGNETS (Lifting)

Ohio Electric Mfg. Co.
5400 Dunham Rd.
Maple Heights, Ohio.

MAGNETIC PARTICLE TESTING

Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.

MANGANESE (Briquets)

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

MATCHPLATES

Accurate Match Plate Co.
1847 W. Carroll St.
Chicago, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Scientific Cast Products Corp.
1388-92 E. 40th St.
Cleveland 3, Ohio.

MEASURING and WEIGHING DEVICES

Baker Perkins, Inc.
Saginaw, Mich.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Gray Company, Inc.
60 11th Ave., Northeast
Minneapolis 13, Minn.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Steel City Testing Machines Inc.
8807 Lyndon
Detroit 38, Mich.
General Mills, Inc.
9200 Wayzata Blvd.
Minneapolis 26, Minn.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)

Foxboro Company
Foxboro, Mass.
Illinois Testing Laboratories, Inc.
420 LaSalle St.
Chicago 10, Ill.

MILLING MACHINES

Cosa Corp.
405 Lexington Ave.
New York 17, N. Y.

MIXERS (Core Wash)

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.

MOLD WASH—See WASH

MOLDING MACHINES (Green Sand)

Adams Co.
Dubuque, Iowa.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
British Moulding Machine Co. Ltd.
Faversham, Kent, England.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Davenport Machine & Foundry Co.
Davenport, Iowa.
Eastern Clay Products Dept.
International Minerals & Chemicals Corp.
Old Orchard Rd.
Skokie, Ill.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
International Molding Machine Co.
LaGrange Park, Ill.
Johnston & Jennings Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.

Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

MOLDING MACHINES (Shell Mold)

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Centrifugal Casting Machine Co.
Tulsa, Okla.
A. C. Chris Co.
9007 South Ashard Ave.
Chicago 20, Ill.
Demmler Mfg. Co.
Kewanee, Ill.
Dependable Pattern Works
1634 S. E. Seventh Ave.
Portland 14, Oreg.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Hutchinson Shell Mold Co.
P. O. Box 188
Alton, Ill.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.
Shell Process Inc.
Bliss & Parkside Sts.
West Springfield, Mass.
Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

MOLDS (Permanent)

Central Pattern Co.
Quincy, Ill.
Centrifugal Casting Machine Co.
Tulsa, Okla.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co., Div.
Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Permanent Mold Die Co.
2275 East 9 Mile Rd.
Hazel Park, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

MOLYBDENUM and COMPOUNDS

Whitehead Metals, Inc.
303 W. 10th St.
New York 14, N. Y.

MOTORS (Electric)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Ohio Electric Mfg. Co.
5400 Dunham Rd.
Maple Heights, Ohio.

MOTORS (Gear)

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Foundry)

Standard Horse Nail Corp.
New Brighton, Pa.

NAILS (Wire)

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.

NICKEL and NICKEL ALLOYS

Alloy Metal Products, Inc.
Rockingham Rd.
Davenport, Iowa.
International Nickel Co., Inc.
67 Wall St.
New York 5, N. Y.
Security Alloys Co.
3104 West 49th Place
Chicago 32, Ill.
Sheritt Gordon Mines Ltd.
25 West King St.
Toronto, Ontario, Canada.
Whitehead Metals Inc.
303 W. 10th St.
New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting, Spray)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Norton Co.
Worcester 6, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Spraying Systems Co.
Bellwood, Ill.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

OIL, LINSEED—See BINDERS

OVENS (Annealing and Heat Treating)—See FURNACES

OVENS (Core and Mold)

Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
George Koch Sons, Inc.
10 South 11th St.
Evansville 12, Ind.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

OVENS (Enameling, Japanning)

Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Hevi-Duty Electric Co.
2040 West Wisconsin Ave.
Milwaukee 1, Wis.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
George Koch Sons, Inc.
10 South 11th St.
Evansville 12, Ind.
Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.

OXYGEN—See GAS

PAINT (Corrosion and Heat Resistant)

Speco, Inc.
7308 Associate Ave.
Cleveland 9, Ohio.

PARTING COMPOUNDS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
The Borden Company
350 Madison Ave.
New York 17, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

PASTE (Core)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
The Borden Company
350 Madison Ave.
New York 17, N. Y.
Corn Products Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Eastern Clay Products, Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Foundries Materials Co.
Coldwater, Mich.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

PATTERN COATINGS

M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Foundry Rubber Inc.
5200 River Road
Washington 16, D. C.
National Chemical & Plastics Co.
1424 Philpot St.
Baltimore 31, Md.

PATTERN COMPOUND

Hysol Corp.
Olean, N. Y.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.
United States Gypsum Co.
300 West Adams
Chicago 6, Ill.

PATTERN DRAW MACHINES—See STRIPPING and DRAWING MACHINES

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

PATTERN SHOP EQUIPMENT

Chicago Wheel & Mfg. Co.
1101 W. Monroe
Chicago 7, Ill.
DoAll Co.
Des Plaines, Ill.
Oliver Machinery Company
Grand Rapids 1, Mich.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

Accurate Match Plate Co.
1847 W. Carroll St.
Chicago, Ill.
Central Pattern Co.
Quincy, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Furane Plastics
4516 Brazil St.
Los Angeles 39, Calif.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Scientific Cast Products Corp.
1388-92 E. 40th St.
Cleveland 3, Ohio.
Shell Process Inc.
Bliss & Parkside St.
West Springfield, Mass.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co.
Rochester, N. Y.
General Electric X-Ray Co.
4855 West Electric
Milwaukee 1, Wis.

PINS (Flask)—See FLASK FITTINGS, PINS and BUSHINGS

PICKLING EQUIPMENT

Pressed Steel Co.
Wilkes-Barre, Pa.

PITCH—See COREBINDERS (Pitch)

PLATES, CORE (Aluminum, Asbestos, Magnesium, Steel)

Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Johns-Manville
22 E. 40th St.
New York 16, N. Y.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

PLUGGERS

Tiffin Foundry Co.
West Adams St.
Tiffin, Ohio.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS

Airetool Mfg. Co.
Springfield, Ohio.
Aro Equipment Corp.
Bryan, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.

Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Texas.
Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Dayton Pneumatic Tool Co.
Dayton 1, Ohio.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Schramm, Inc.
West Chester, Pa.
Thor Power Tool Co.
Aurora, Ill.

POTS (Melting)

Acme Foundry Co.
2503 22nd St.
Detroit 16, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Tiffin Foundry Co.
West Adams St.
Tiffin, Ohio.

POURING DEVICES

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Cleveland Tramrail Div.
Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Hawley Mfg. Co.
411 North Wabash
Wabash, Ind.
Industrial Equipment Co.
Minster, Ohio.
International Automation Corp.
Ann Arbor, Mich.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

PRESSES (Casting, Straightening and Trimming)

Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

PRESSURE RECORDERS

Foxboro Company
Foxboro, Mass.

PULLEYS (Belt, Selfcleaning)

Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Van Gorp Mfg. Co., Inc.
Box 123
Pella, Iowa.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS (Liquid)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
Gray Company, Inc.
60 11th Ave., Northeast
Minneapolis 13, Minn.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.

PUMPS (Vacuum)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.

PUSH-OFF MACHINES—See STRIPPING, DRAWING and ROLLOVER MACHINES

PUTTY (Foundry)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

PYROMETERS

Epic, Inc.
150 Nassau St.
New York 48, N. Y.
Foxboro Company
Foxboro, Mass.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Illinois Testing Laboratories
420 N. LaSalle St.
Chicago 10, Ill.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

RACKS (Core Oven)

Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.

RADIOGRAPHIC EQUIPMENT

Budd Co.
Nuclear Systems Div.
2950 Roberts Ave.
Philadelphia 29, Pa.
Eastman Kodak Co.
Rochester, N. Y.
Picker X-Ray Corp.
25 S. Broadway
White Plains 10, N. Y.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Magnethermic Corp.
3990 Simon Rd.
Youngstown 1, Ohio.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Babcock & Wilcox Co.
161 42nd St.
New York 17, N. Y.
Campbell-Hausfeld Co.
Harrison, Ohio.
Carborundum Co.
Perth Amboy, N. J.
Cedar Heights Clay Co.
Oak Hill, Ohio.
Cement Gun Co.
1520 Walnut St.
Allentown, Pa.
Denver Fire Clay Co.
2301 Blake St.
Denver 2, Colo.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Great Lakes Carbon Co.
18 E. 48th St.
New York 17, N. Y.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Kaiser Refractories & Chemical Div.
300 Lakeside Drive
Oakland 12, Calif.
Illinois Clay Products Co.
Joliet, Ill.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Ironton Fire Brick Co.
Ironton, Ohio.
Johns-Manville
22 E. 40th St.
New York 16, N. Y.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
National Carbon Co., Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
North American Refractories Co.
National City Bank Bldg.
Cleveland 14, Ohio.
Norton Co.
Worcester 6, Mass.
H. K. Porter Co.
Refractories Div.
Porter Bldg.
Pittsburgh 19, Pa.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Chas. Taylor Sons Co.
710 Burns St.
Cincinnati 4, Ohio.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

REFRACTORY GUNS

Cement Gun Co.
1520 Walnut St.
Allentown, Pa.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

RELEASE AGENTS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
The Borden Company
350 Madison Ave.
New York 17, N. Y.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
United Oil Mfg. Co.
Erie, Pa.

RESIN—See BINDERS

RESPIRATORS

American Optical Co.
Southbridge, Mass.
Pangborn Corporation
1400 Pangborn Blvd.
Hagerstown, Md.

RIDDLES (Hand)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

RIDDLES (Power)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.
States Engineering Corp.
243 East Murray St.
Ft. Wayne, Ind.

RISER COMPOUND—See EXOTHERMIC COMPOUNDS

ROLLOVER MACHINES—See STRIPPING, DRAWING and ROLLOVER MACHINES

ROPE (Wire)

American Chain & Cable Co., Inc.
271 S. Pennsylvania Ave.
Wilkes-Barre, Pa.

SAFETY EQUIPMENT

American Optical Co.
Southbridge, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.
Wheeler Protective Apparel, Inc.
224 West Huron St.
Chicago 10, Ill.

SAND (Core, Molding, Blasting)

Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Orefraction Inc.
Andrews, South Carolina
Ottawa Silica Co.
Ottawa, Ill.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Pennsylvania Glass Sand Corp.
140 Stanwix St.
Pittsburgh 22, Pa.
Standard Silica Co.
Ottawa, Ill.
Wedron Silica Co.
135 S. LaSalle St.
Chicago 3, Ill.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SAND (Resin Coated)

Aurora Metal Co.
Aurora, Ill.
Acme Resin Corp.
1400 Circle Ave.
Forest Park, Ill.
Nopco Chemical Co.
60 Park Place
Newark, N. J.
Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.

SAND (Zircon)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 100th St.
Cleveland 2, Ohio.
Berkshire Chemicals, Inc.
630 Third Ave.
New York 17, N. Y.
Carpenter Brothers, Inc.
606 West Wisconsin
Milwaukee 3, Wis.
Orefraction Inc.
Andrews, South Carolina

SAND ADDITIVES

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Chemicals Inc.
Sub. National Lead Co.
P. O. Box 1675
Houston 2, Tex.
Cedar Heights Clay Co.
Oak Hill, Ohio.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Eastern Clay Products Div.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.
Hartley Controls Corp.
P. O. Box 290
Netenah, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

SAND PREPARATION EQUIPMENT

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baker Perkins, Inc.
Saginaw, Mich.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Carrier Conveyor Div.
Chain Belt Co.
211 N. Jackson St.
Louisville 2, Ky.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Clearfield Machine Co.
Clearfield, Pa.
Cleveland Tramrail Div.
Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.
B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Hartley Controls Corp.
P. O. Box 290
Neenah, Wis.
International Automation Corp.
Ann Arbor, Mich.
International Clay Machinery Co.
of Delaware
1303 Knot Bldg.
Dayton, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
The Moulders' Friend
Dallas City, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Royer Foundry & Machine Co.
Kingston, Pa.
T. L. Smith Co.
2835 N. Third St.
Milwaukee 12, Wis.
States Engineering Corp.
243 East Murray St.
Ft. Wayne 2, Ind.
Webster Mfg. Co.
Tiffin, Ohio.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

SAND RAMMERS

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Texas.
Dayton Pneumatic Tool Co.
Dayton 1, Ohio.
Gardner-Denver Co.
Gardner Drive
Quincy, Ill.
Ingersoll Rand Co.
11 Broadway
New York 4, N. Y.

SAND RAMMING MACHINES (Slinger Type)

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Ontario, Canada.

SAND RECLAIMING EQUIPMENT

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
Hydro-Blast Division, Guardite Co.
Div. of American Marietta Co.
Wheeling Road
Wheeling, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Stearns Magnetic Products Div.
Indiana Steel Products Co.
635 South 28th St.
Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STABILIZER

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Chemicals Inc.
Sub. National Lead Co.
P. O. Box 1675
Houston 2, Texas.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

DoAll Co.
Des Plaines, Ill.
Grinding & Polishing
Machinery Corp.
2530 Winthrop Ave.
Indianapolis 5, Ind.
Oliver Machinery Company
Grand Rapids 1, Mich.

SAWS (Band, Metal, Wood and Saw Accessories)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Oliver Machinery Co.
Grand Rapids 1, Mich.
Tannewitz Works
301 Front St., N. E.
Grand Rapids 4, Mich.

SCREENS (Shakeout, Vibrating and Rotary)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carrier Conveyor Div.
Chain Belt Co.
211 N. Jackson St.
Louisville 2, Ky.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Great Western Mfg. Co.
Leavenworth, Kans.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Stephens-Adamson Mfg. Co.
Aurora, Ill.

SEA COAL

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Penn-Rilton Co.
324 W. 23rd St.
New York 11, N. Y.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SEALING COMPOUND (Mold)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Presstite Div.
American Marietta Co.
3738 Chouteau
St. Louis 10, Mo.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SEPARATORS (Compressed Air Contaminant)—See FILTERS and SEPARATORS

SEPARATORS (Magnetic)

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
American Magnetics Co.
309 16th St.
Moline, Ill.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Homer Mfg. Div
Ohio Electric Mfg. Co.
142 East Pearl St.
Lima, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
National Engineer.ng Co.
549 W. Washington St.
Chicago 6, Ill.
Ohio Electric Mfg. Co.
5400 Dunham Rd.
Maple Heights, Ohio.
Stearns Magnetic Products Div.
Indiana Steel Products Co.
635 South 28th St.
Milwaukee 46, Wis.

SHAKEOUT MACHINERY

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
The Branford Co.
132 Glen St.
New Britain, Conn.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Royer Foundry & Machine Co.
Kingston, Pa.
Simplicity Engineering Co.
Durand, Mich.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Webster Mfg. Co.
Tiffin, Ohio.

SHELL MOLDING—See Binders, Core and Mold (Resin)
MOLDING MACHINES (Shell Mold)
SAND (Resin Coated)

SHELVING (Prefabricated Steel)

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.

SHOT and GRIT

Abrasive Shot and Grit Co.
Springville, N. Y.
Alloy Metal Abrasive Co.
121 S. Division St.
Ann Arbor, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cleveland Metal Abrasive Co.
887 E. 67th St.
Cleveland, Ohio.
Globe Steel Abrasive Co.
Mansfield, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Macklin Co.
Jackson, Mich.
Metal Blast, Inc.
871 E. 67th St.
Cleveland, Ohio.
National Metal Abrasive Co.
3560 Norton Ave.
Cleveland 7, Ohio.
Norton Co.
Worcester 6, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

SHOT TESTING MACHINES

Alloy Metal Abrasive Company
121 S. Division St.
Ann Arbor, Mich.

SHOVELS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

SHOVELS (Power)

Clark Equipment Co.
Construction Machinery Div.
Benton Harbor, Mich.
Clark Equipment Co.
Industrial Truck Div.
Battle Creek, Mich.
Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.

SILICOMANGANESE

Pickands Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Union Carbide Metals Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

SILICON (Briquets)

Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Union Carbide Metals Co.
Div. Union Carbide Corp.
535 Fifth Ave.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

SILICON CARBIDE (Briquets)

Ohio Ferro Alloys Corp.
Canton 9, Ohio.

SILOS

Marietta Concrete Corp.
Marietta, Ohio.

SKIMMERS

Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SMELTERS and REFINERS

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SODA ASH

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Olin Mathieson Chemical Corp.
400 Park Ave.
New York, N. Y.

SODIUM SILICATE—See BINDERS

SOLDER

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.
Whitehead Metals Inc.
303 W. 10th St.
New York 14, N. Y.

SPECTROGRAPHIC ANALYSIS (Equipment and Materials)

Baird-Atomic, Inc.
33 University Rd.
Cambridge 38, Mass.

SPEED REDUCERS

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

SPRAY GUNS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
The Branford Co.
130 Chesnut St.
New Haven 7, Conn.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Metallizing Co. of America
3520 W. Carroll Ave.
Chicago 24, Ill.
James A. Murphy & Co.
Hamilton, Ohio.

SPRUE CUTTERS

Adams Co.
Dubuque, Iowa.
Beardsley & Piper
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Milwaukee Chaplet & Mfg. Co.
1023 S. 40th St.
Milwaukee, Wis.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

STEEL (Structural)

American Bridge Div.
United States Steel Corp.
52 S. Wm. Penn Pl.
Pittsburgh 19, Pa.

STRAIGHTENERS and CUTTERS (Core Rod)

Beardsley & Piper
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

STRAINER CORES—See CORES (Strainer, Riser, Breakoff)

STRIPPING, DRAWING and ROLLOVER MACHINES

The Adams Co.
Dubuque, Iowa.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Davenport Machine & Fdry. Co.
Davenport, Iowa.
F. E. (North America) Ltd.
47 Advance Road
Toronto 18, Canada.
Greenlee Bros. & Co.
2136 Twelfth St.
Rockford, Ill.
International Molding Machine Co.
LaGrange Park, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.

SUPPLY HOUSES (Foundry)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Combined Supply & Equipment Co. Inc. 215 Chandler St.
Buffalo 7, N. Y.
Eastern Clay Products, Dept.
International Minerals & Chemical Corp.
Old Orchard Rd.
Skokie, Ill.
Foundries Materials Co.
Coldwater, Mich.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.

SWEEPERS (Magnetic)

Homer Mfg. Div.
Ohio Electric Mfg. Co.
142 East Pearl St.
Lima, Ohio.

TABLES

Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Nomad Equipment Corp.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

TELLURIUM

American Smelting & Refining Co.
120 Broadway
New York 5, N. Y.

TEMPERATURE CONTROL and RECORDING EQUIPMENT

Foxboro Co.
Foxboro Mass.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Illinois Testing Laboratories
420 N. LaSalle St.
Chicago 10, Ill.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.

TENSILE TESTING MACHINES

Detroit Testing Machine Co.
9390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Steel City Testing Machines Inc.
8807 Lyndon
Detroit 38, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Illinois Testing Laboratories
420 N. LaSalle St.
Chicago 10, Ill.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.
Tiffin Foundry Co.
West Adams St.
Tiffin, Ohio.

TILE (Gate)

Ferro Corp.
Louthan Div.
East Liverpool, Ohio.

TIMERS (Electric)

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

TIRES (Industrial)

United States Rubber Co.
1230 Ave. of Americas
New York 20, N. Y.

TONGS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Industrial Equipment Co.
Minster, Ohio.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Johnston Mfg. Co.
2825 E. Hennepin Ave.
Minneapolis 13, Minn.
Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

TORCHES (Metal Removal)

Arcair Co.
465 South Mt. Pleasant Ave.
Lancaster, Ohio.

TRACTORS—See TRUCKS (Utility and Power Lift)

TRANSVERSE TESTING MACHINES

Pasadena Hydraulic Inc.
1433 Lindcombe St.
El Monte, Calif.
Steel City Testing Machines Inc.
8807 Lyndon
Detroit 38, Mich.

TROLLEYS

Curtis Pneumatic Machinery Div.
Curtis Mfg. Co.
1905 Kienlen Ave.
St. Louis 20, Mo.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
Planet Corp.
P. O. Box 7
Lansing 1, Mich.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

TRUCK CRANES

Drott Mfg. Co.
3126 South 27th St.
Milwaukee 15, Wis.
Elwell-Parker Electric Co.
4205 St. Clair Ave.
Cleveland 3, Ohio.
Towmotor Corp.
1226 East 152nd St.
Cleveland 10, Ohio.

TRUCKS (Core)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

TRUCKS (Dump)

Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
Tractomotive Corp.
Deerfield, Ill.

TRUCKS (Utility and Power Lift)

Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Clark Equipment Co.
Industrial Truck Div.
Battle Creek, Mich.
Elwell Parker Electric Co.
4205 St. Clair Ave.
Cleveland 3, Ohio.
Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.
Nomad Equipment Corp.
3110 West Fond du Lac Ave.
Milwaukee 10, Wis.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Towmotor Corp.
1226 East 152nd St.
Cleveland 10, Ohio.
Tractomotive Corp.
Deerfield, Ill.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

TUBES (Furnace vent, radiant, thermocouple protection)

Pressed Steel Co.
Wilkes-Barre, Pa.

TUMBLING BARRELS

United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

TUMBLING STARS

Quincy Foundry Inc.
Quincy, Ohio.

TURNTABLES

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Chase Foundry & Mfg. Co.
2300 Parsons Ave.
Columbus 7, Ohio.
F. E. (North America) Ltd.
47 Advance Rd.
Toronto 18, Canada.
Modern Equipment Co.
Port Washington, Wis.
Newaygo Engineering Co.
Newaygo, Mich.
Nomad Equipment Corp.
3110 West Fond du Lac Ave.
Milwaukee 10, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Taccone Pneumatic Fdry. Eqt. Co.
P. O. Box 468
North East, Pa.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

UNLOADERS (Car)

Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.

VACUUM CLEANERS

Spencer Turbine Co.
Hartford, Conn.
U. S. Hoffman Machinery Corp.
105 4th Ave.
New York 3, N. Y.

VALVES (Blow-off and Cut-off)

Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Tex.
Hunt Valve Co.
1913 East State St.
Salem, Ohio.
Ross Operating Valve Co.
12 East Golden Gate
Detroit 3, Mich.
Valvair Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.

VALVES (Gas, Oil, Water, Steam)

Bellows Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.
Cleco Div.
Reed Roller Bit Co.
5125 Clinton Drive
Houston 20, Tex.
Hunt Valve Co.
1913 East State St.
Salem, Ohio.
Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Ross Operating Valve Co.
12 East Golden Gate
Detroit 3, Mich.
Valvair Div.
International Basic Economy Corp.
P. O. Box 631
Akron 9, Ohio.

VENTILATING—See DUST COLLECTING, EXHAUST, COOLING SYSTEMS

VENTS (Core)

Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
Domestic Industries
470 W. Broad St.
Columbus 23, Ohio.
Martin Engineering Co.
Neponset, Ill.
Ronson Industries
110 East 115th St.
Chicago 28, Ill.
Smillie, C. M., & Co.
1124 Woodward Heights Blvd.
Ferndale 20, Mich.

VENTS (Corebox)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
Smillie, C. M., & Co.
1124 Woodward Heights Blvd.
Ferndale 20, Mich.

VIBRATORS

Adams Co.
Dubuque, Iowa.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Branford Co., The
130 Chestnut St.
New Haven 7, Conn.
Cannon Vibrator Co.
1111 Power Ave.
Cleveland 14, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Cleveland Vibrator Co.
2828 Clinton Ave.
Cleveland 13, Ohio.
Davenport Machine & Foundry Co.
Davenport, Iowa.
Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburg 22, Pa.
International Molding Machine Co.
LaGrange Park, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1059-FWTB
Prudential Plaza
Chicago 1, Ill.
Martin Engineering Co.
Neponset, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co.
Urbana, Ohio.

WASH (Core and Mold)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
M. A. Bell Co.
217 Lombard St.
St. Louis 2, Mo.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
Corn Products Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Foundries Materials Co.
Coldwater, Mich.
Foundry Rubber Inc.
5200 River Road
Washington 16, D. C.
Foundry Services, Inc.
P. O. Box 8728
Cleveland 35, Ohio.
National Carbon Div.
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Pennsylvania Pulverizing Co.
140 Stanwix St.
Pittsburgh 22, Pa.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 26, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
United Oil Mfg. Co.
1429 Walnut St.
Erie, Pa.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

WATER CONDITIONING EQUIPMENT

Aquadyne Corp.
89 Terminal Ave.
Clark, N. J.

WEDGES (Foundry)

Adams Co.
Dubuque, Iowa.

WELDING APPARATUS (Electric Arc, Inert Gas)

Harnischfeger Corp.
4400 West National Ave.
Milwaukee 46, Wis.
Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Metallizing Co. of America
3520 W. Carroll Ave.
Chicago 24, Ill.
Miller Electric Mfg. Co.
Appleton, Wis.
Rexarc, Inc.
West Alexandria, Ohio.

WELDING GAS—See GAS

WELDING RODS—See ELECTRODES and RODS

WHEELBARROWS

Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

WHEELS (Wire Brush)

Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.

WIRE CUTTERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

WOODWORKING MACHINERY

DoAll Co.
Des Plaines, Ill.
Oliver Machinery Co.
Grand Rapids 1, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co.
1135 S. 70th St.
Milwaukee 14, Wis.
Ansco Co.
171 Clinton St.
Binghamton, N. Y.
Budd Co., Nuclear Systems Div.
2950 Roberts Ave.
Philadelphia 29, Pa.
General Electric X-Ray Co.
4855 West Electric
Milwaukee 1, Wis.
Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.

X-RAY FILM and ACCESSORIES

Ansco Co.
171 Clinton St.
Binghamton, N. Y.
Eastman Kodak Co.
Rochester, N. Y.
General Electric X-Ray Co.
4855 West Electric
Milwaukee 1, Wis.
Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.

ZINC

Alloys & Chemicals Mfg. Co. Inc.
4365 Bradley Rd.
Cleveland 9, Ohio.
Federated Metals Div., American
Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

ZIRCONIUM ALLOYS

Union Carbide Metals Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

CLASSIFIED ADVERTISING

• HELP WANTED

FOUNDRY QUALITY CONTROL SUPERVISOR

Immediate opening in Rochester, New York, firm for man to direct the inspection of castings and to maintain quality in modern steel, gray iron, and non-ferrous foundry. Firm recently completed million dollar expansion and modernization program in foundry. Applicant should have technical background and good foundry experience. Should be familiar with gating and risering of steel castings. Excellent opportunity with substantial fringe benefits including profit sharing. Send resume of work experience and salary requirements to:

BOX 331, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Medium size malleable foundry located in Ontario requires capable foundry superintendent. The man we are looking for must be a university graduate with several years' experience in labor relations and in the age bracket 30-45. Salary is open and will be determined according to qualifications. Reply in full confidence.

BOX 316 FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY METALLURGICAL ENGINEER

Wanted for nonferrous foundry. Must have experience on problems of gating, risering, pouring, sands and cores. B. S. Degree in Engineering required. Must have minimum of five years' experience. Age 28-50. Excellent opportunity for capable and energetic man. Salary open. Please reply stating your personal data, qualifications, experience, salary expected and availability in first letter. All inquiries will be held in strict confidence. Direct all correspondence to: Ampco Metal, Inc., Personnel Department, Box 2004, Milwaukee 1, Wisconsin.

WORKING FOREMAN WANTED

Capable of handling all phases of production. Must be experienced and expert in nonferrous field. Send complete resume, salary desired and references. Address: Box 322, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MAINTENANCE ENGINEER

Graduate mechanical engineer experienced in organizing and supervising maintenance and repair of all types of foundry machinery. Age to 45. Reply should include complete resume, salary desired and references.

BOX 320, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Aluminum Permanent Mold
Foundry Foreman
in
Northeastern Area

Salary Open

Box 310, FOUNDRY
PENTON BLDG., CLEVELAND 13, OHIO

NONFERROUS FOUNDRY FOREMAN

Young aggressive molder or supervisor with experience in melting and coremaking in nonferrous foundry operations. Located near Cleveland pouring aluminum and brass castings. In reply state age, schooling, past and present employment. Salary open. Address: Box 327, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• HELP WANTED

STEEL FOUNDRY METALLURGIST

Experienced for carbon, low alloy and stainless foundry with emphasis on high alloys. Must be capable of directing chemical and physical testing laboratory, melting, sand control and planning operations. Location—Eastern Pennsylvania. Send complete resume, including salary requirement, which will be held in confidence.

BOX 335, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PERMANENT MOLD ENGINEER

Experienced man to handle mold design and plant engineering. Excellent opportunity for right man with established growing organization in East. Address: Box 326, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER'S ASSISTANT

For cast iron plumbing fixture plant, needs rounded out knowledge to back up manager. Address: Box 332, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

B.S. Degree. A recent graduate or a man with several years experience. We produce gray iron and ductile. Please provide complete background in first letter including references and salary desired. Colorado location. Address: Box 334, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXPERIENCED METALLURGIST

Who has been in foundry operations for at least three to five years. Should have gray iron and aluminum experience. Must be college graduate and be willing to relocate to southeastern Minnesota. National corporation with excellent company benefits. Please give complete resume of experience and salary requirement in first reply. Address: Box 312, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ENGINEER

With substantial foundry design and layout experience. Knowledge of modern materials handling equipment and material flows required. Real opportunity with excellent salary, bonus and profit sharing. Degree is essential. Send complete details in confidence.

BOX 363, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN

Wanted for production and semiproduction, Gray Iron and Aluminum shop. Must have Cupola, Molding and Sand experience.

A good opportunity with a well established company, located upstate New York.

BOX 359, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

DRY SAND FOREMAN

Qualified and progressive foreman desired in HEAVY DRY SAND MOULDING DEPT. Producing castings up to 30 tons. Well established high strength iron foundry in northern Ohio. Address: Box 336, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• POSITIONS WANTED

GOOD CASTING ACCOUNTS

Are best acquired (and held) through the aggressive salesmanship and know-how of a foundryman with a solid background of accomplishment in sales, management and consulting capacities: One who is qualified to assist customers on engineering, metallurgical and technical problems. Open for negotiations with stable and progressive gray iron production foundry. Address: Box 339, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• POSITIONS WANTED

OPPORTUNITY WANTED

Foundryman desires connection with growing shop in which he can invest capital plus the experience of years in management, research, and quality control. Address: Box 351, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT—MANAGER

Metallurgist and foundryman looking for growing, progressive foundry to which he can devote energy and ambition in exchange for lucrative future. Experience includes management, research, quality control, plus early trades training. Address: Box 350, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL OR WORKS MANAGER

Age 44, Mechanical Engineer, 25 years' experience in all phases of ferrous foundry operations including machine shop and equipment erection. Thorough knowledge of labor relations and negotiating procedures, sales and accounting methods. Presently employed seeking a more progressive company. Address: Box 352, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ALUMINUM FOUNDRYMAN

Ten years as Superintendent, Production Manager, Foreman, etc. Production, jobbing and experimental castings of high quality. Know all phases of nonferrous foundry operation including heat treatment and alloying. Age 39. Available. Address: Box 337, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMOLD

Engineer, designer. Age 46. With long varied experience—10 years as chief engineer. Seeks change. Medium size foundry preferred. Address: Box 354, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER OR ASSISTANT

Sixteen years in ferrous and alloy foundries. Experience includes supervision in Pattern Shop, Core Room and Quality Control Department. Foundry representative at two major automotive companies. Now employed top level management, gray iron and alloy foundry. Proven record of departmental co-ordination. Desires relocation. Overseas considered. Address: Box 357, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Aggressive practical foundryman technically trained. Thirty years' background jobbing and production, producing quality work at minimum costs. Small and large castings. Results obtained. Age 55. Address: Box 355, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Competent and progressive with good record. Desires to make change. Will relocate. Address: Box 343, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TECHNICAL SALES REPRESENTATIVE

Experienced technical sales representative desires Michigan, Ohio, Indiana Territory. Practical and technically trained supervisor in iron and steel. Send replies to: Box 346, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT

Technical and practical knowledge of all phases of ferrous and nonferrous jobbing and production foundries. Metallurgical background 22 years' supervisory experience. Good trouble shooter. Best of labor relations. Age 46. Employed. Address: Box 341, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

20 years' experience, 9 years' sales and service. Supervisory experience latest automatic molding units and all phases of foundry operation. Know cupola, air furnace, sand control and rigging. Sales or superintendent position desired in gray iron or malleable foundry. Presently employed as Assistant Superintendent. Address: Box 345, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOULDER

Practical jobbing floor and pattern plate molder, with I.C.S. Foundrymen's Diploma, desires connection as molder with well established and growing Foundry. Please quote fully. Address: G. C. Bradshaw, 701-14th Street, Phenix City, Alabama. Phone CY 7-1025.

• POSITIONS WANTED

PACIFIC NORTH WEST FOUNDRIES

Does your top management team need a resourceful and intelligent individual with imagination, productivity and integrity plus a diversified gray iron foundry experience? Engineer graduate with added business education. Journeyman. Middle thirties.

BOX 329, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

SUPERINTENDENT

Practical foundryman with over twenty years' experience in gray iron and semi-steel jobbing of heavy machinery and automotive die work. Several years as supervisor. Thorough knowledge of gating, risering, sand-conditioning and scrap control. Age 39. Married. Now Employed. Address: Box 323, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DIE CASTING ENGINEER

With 20 years' experience available after June 1, 1960. Ten years in die design—last ten as superintendent of complete operation from estimate through production. Sales, engineering, or partnership interest.

BOX 328, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY ENGINEER

Graduate metallurgist. Fifteen years' experience in all phases of gray iron and nonferrous foundry operations. Age 35. Free to relocate. Address: Box 311, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With metallurgical background, experience in all phases, light and heavy ferrous and nonferrous foundry operations, as well as ductile iron, with low scrap rates. 36 years old with 18 years' experience, presently employed as Plant Superintendent, wishing to relocate South or Pittsburgh. Address: Box 313, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT-MANAGER

Graduate Metallurgical Engineer—Experience in iron and steel, cupola, electric furnace and open hearth operations. Cost and quality minded. Seeking permanent position. Presently employed as Foundry Manager. Address: Box 344, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXPERIENCED GRADUATE ENGINEER

Qualified general Superintendent is seeking a position with a progressive concern. Broad and varied knowledge of all phases of steel foundry functions. Presently employed. Will relocate. Address: Box 318, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Thirty-four years' experience, ferrous and nonferrous, practical and technical, twenty years' supervisor. Prefer small shop. Now employed. Age 55. Address: Box 347, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY TROUBLE-SHOOTER

Former foreman and superintendent. Thoroughly experienced and expert on sands, facings and gating. Qualified for spot trouble-shooting with gray iron and alloys experience. Desire part time employment. Address: Box 317, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES POSITION

Graduate of Naval Shipyard Apprentice School (foundry practice) also college graduate Business Administration. Several years' sales experience, desire position in sales. New England area preferred. Address: Box 360, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• ACCOUNTS WANTED

REPRESENTATION AVAILABLE

Three man organization, headquarters in Hartford, Connecticut, established four years, seeks association with first class gray iron foundry. Serving New England, New York (metropolitan area), New Jersey. Write—Phone—Wire. Address: The Robert M. Jones Agency, 40 Mountain Road, West Hartford, Connecticut. Jackson 3-4576.

• ACCOUNTS WANTED

ESTABLISHED REPRESENTATIVE

Desires to represent Steel Foundry capable of producing castings 1 to 10,000 lbs., prefer electric furnace operation, carbon, low alloys. Have active following steel castings field, Northern Ohio. Three man office, headquarters Cleveland. Address: Box 315, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPPLIERS LIMITED, 25a COCKSPUR STREET, LONDON, S.W.1., ARE SEEKING ADDITIONAL AGENCY IN GREAT BRITAIN FOR LATEST FOUNDRY EQUIPMENT.

REPRESENTATIVE AVAILABLE

Experienced all phases of foundry business. New Jersey Resident. Address: Box 358, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• REPRESENTATIVES WANTED

SALES REPRESENTATION

For Todd Thermo Hot Blast Cupola Air Heaters and Portable Mold and Core Dryers
Regional or State territories available
Address In Confidence to
Mr. M. E. Prowler, Sales Manager Products Div.

TODD SHIPYARDS CORP.

Columbia and Halleck Sts. Brooklyn 31, N. Y.

SALES REPRESENTATION

Magnesium and aluminum foundry wants top flight sales representation. Unlimited production capacity as to size and type of castings. Address: Box 349, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVES ALUMINUM PERMANENT MOLD & DIE CASTINGS

Large Eastern foundry has openings for exclusive representation in New England, New York State, Eastern Pennsylvania. Require top flight men only, who are now selling allied lines. Write listing details, including territory covered, lines handled. Address: Box 325, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

We would like a man who is currently calling on pattern shops and foundries to sell a complete line of pattern lacquers. Address: Box 342, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALESMEN AND MANUFACTURER'S REPRESENTATIVES

We are interested in "live wires" to sell top quality CO^2 Binders in Middle Atlantic States. Contact Herbert H. Klein, 207 Essex Street, Boston, or at Warwick Hotel, Philadelphia, May 9th through 13th.

REPRESENTATIVES WANTED

Manufacturer of high precision, powerful pneumatic tools—portable grinders, sanders, drills—seeks men now selling to foundries, investment casting firms, tool and die shops and other metal working industries. Profitable expanding line. Excellent repeat business. Please state area now covering. Manufacturers now representing. Address: Box 321, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURER'S REPRESENTATIVE

A medium size Malleable Castings Company, in business fifty years, is seeking a sales representative in North and South Carolina. We are located in Eastern Pennsylvania and manufacture quality Malleable Castings. Address: Box 333, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVES WANTED

Two sales representatives desired. Territories open in Pittsburgh and West of Pittsburgh. Highest quality foundry producing superior aircraft and special commercial steel and high alloy castings. Catering to most complex requirements utilizing revolutionary close-tolerance special refractory molding techniques. Prefer men with engineering background and excellent following. Remarkable opportunity for aggressive men in a dynamic organization. You will be backed up by most brilliant technical personnel in the foundry business. Write us about yourself in detail and state territory desired in first letter. Address: Box 361, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• FOUNDRIES FOR SALE

GRAY IRON FOUNDRY FOR SALE
APPROXIMATELY 15000 SQ. FEET

Located in Illinois with excellent rail and truck facilities. Now operating. Pouring 10-15 tons per day. Could pour 20-25 tons. Airless blast, B-P #50 speedmuller, annealing oven, overhead pouring systems, modern core room with 3 core blowers and oil fired ovens.

Complete maintenance room 36" Cupola with skip hoist. Miscellaneous castings produced from 1 oz. to 50 lbs. Small Aluminum shop—200 lb Fisher Furnace, gas fired.

Sales 1959 over $400,000. Good profit potential. Good help available, including skilled, unskilled and supervision. Owners salaries can pay for this shop in 7 years. Terms can be arranged. Present owners retiring.

BOX 338, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOR SALE

Fully equipped now operating gray iron foundry in western New York State for sale. Located near the New York Power Development. Reason for selling, present owners want to retire.

BOX 340, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

A very profitable gray iron, operating, foundry in Eastern Pennsylvania pouring 10 tons per day. Address: Danville Foundry Corp., P. O. Box 119, Danville, Pennsylvania.

FOR SALE

Aluminum Sand Foundry. Employees 10. Jobbing and Production. Sales $120.000.00 annually. Business is known for quality castings. Address: Box 356, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• WANTED-TO-BUY

EQUIPMENT WANTED

15 x 20 Wheelabrator Tumblast
Please State
Price, Condition, Serial Number

MARLBOROUGH FOUNDRY, INC.

555 Maple Street

Marlboro, Mass.

WANTED

Used 18" x 18" Stack Flasks
3" or 3½" depth. Address:
Great Lakes Founders & Machine Corp.
Ludington, Michigan

MIXER WANTED

Used Simpson Intensive Sand Mixers, State size, condition and lowest cash price for immediate acceptance. Address: Box 319, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Used or Broken Silicon Carbide Grinding Wheels of any kind or size, regardless of bond. Will pay $35.00 per ton. Union Mining Co., 1st Nat'l. Bank Bldg., Pittsburgh 22, Pa.

WANTED

One 6' to 8' Top Charge Direct
Arc Furnace
In good condition
Complete with all electrics
including
13800 Volt Primary on Transformer

BOX 353, FOUNDRY

PENTON BLDG., CLEVELAND 13, OHIO

CUPOLA WANTED

Whiting Model "C"
size 3 or 3½ or 4
complete with skip hoist
and bucket.

SMITH SYSTEM MFG. COMPANY
212 ONTARIO STREET, S.E.
MINNEAPOLIS 14, MINNESOTA

• EMPLOYMENT SERVICE

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited

From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **FINANCIAL 6-8700**

JOHN COPE, DIRECTOR, 29 E. MADISON ST., CHICAGO 2, ILL.

FLOOR MOLDING FOREMAN

7,200 TO 9,000

Progressive organization seeking promotable type man, who can assume complete departmental supervision. Client pays all expenses. Contact Bill Newell in confidence.

MONARCH PERSONNEL

28 EAST JACKSON BLVD., CHICAGO 4, ILL.

FOUNDRY ENGINEER

$9,000 to $11,000

Young Engineer, interested in assure future with rapidly expanding, progressive foundry where competence is rewarded with advancement. Client assumes all expenses. Contact Bill Newell in confidence.

MONARCH PERSONNEL

28 EAST JACKSON BLVD. CHICAGO 4, ILL.

• FOUNDRY CONSULTANTS

FOUNDRY CONSULTANTS

FERROUS AND NONFERROUS

Are you standing too close to the forest to see the trees? Problems becoming chronic because of out-moded methods? We specialize in analyzing your problems and carry out constructive and corrected procedures. Highly successful in nonferrous melting practices, heading, gating and sand control.

FOUNDRY SERVICES

P. O. BOX 305 **DECATUR, ILLINOIS**

FOUNDRY CONSULTANT

Formerly foundry engineer, Whitehead Metals Inc. (subsidiary International Nickel Co.). Ferrous and nonferrous foundry practice, covering ductile iron, ductile Ni-Resist nickel, monel, brass and bronze, alloy irons and steels. Cupola, electric and crucible furnace operation. Phone DElaware 7464. Address: Joseph Nixon, 1175 Colvin Avenue, Kenmore 23, New York.

FOUNDRY CONSULTANT-NONFERROUS

Sand casting—permanent mold casting—centrifugal castings—in aluminum—brasses—bronzes—30% leaded bronze—aircraft quality bearings and castings. Address: ED JENKINS, 286 PENOBSCOTT BLDG., DETROIT 26, MICHIGAN, PHONE: WOODWARD 5-7947.

• FOR SALE

FOR SALE

#1½ Simpson Mixer—unit drive $2,250.00

(2) American Wheelabrators 42 x 48 ea. 1,750.00

Furnace—Hand Tilting type 400 lb. Alum. gas burner 450.00

Fisher Electric Tilting furnace 800 lb. 1,500.00

BALCHER MACHINERY COMPANY

695 E. 152ND STREET, CLEVELAND 10, OHIO

GLenville 1-2474

WHEELABRATORS

We have just purchased the following good used Wheelabrators. PRICED FOR QUICK SALE if moved from present location.

First come, first choice

Dealers Invited.

2—48 x 48 Tumblast

8—42 x 48 Tumblast

2—27 x 36 Tumblast

1—8' Pangborn Table Blast

1—4' Pangborn Table Blast

Dust collectors available if desired.

Trade in accepted.

Also Terms available.

Many other guaranteed Rebuilt machines in stock.

DIAMOND SALES INC.

5654 W. JEFFERSON AVE.

DETROIT 9, MICHIGAN

PHONE VINEWOOD 3-6750

• FOR SALE

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to carry a complete line of "Hard Chrome Rebuilt Tools" at about half the cost of new tools. Before you discard your old tools, why not send them to us for our estimate on the cost of renewing them with our Hard Chrome Process?

CENTRAL PNEUMATIC SERVICE, INC.

512 LINDEN AVENUE

DAYTON 3, OHIO

PHONE: CL 2-2701

FOR SALE

FLEXIBLO CORE BLOWER Model CB-5CD, with Flexigas Gasing Unit for CO_2 Cores . . . almost new

REDA 500# Reverb-type Tilting (hand) Furnace for nonferrous . . . good condition.

OSBORN #559 Jolt Squeeze Pin Lift . . . like new

SPO—#110 J Portable—#2114 Post or Column Type—#2114 Cantilever . . . all are good

BESLEY 54" Horizontal Grinder—complete with motor and dressing rig

OSCILLATING CONVEYORS—any width and length to your specification

For this and other good equipment contact

W. O. McMAHON

BOX 5799 **HOMEWOOD STATION**

BIRMINGHAM 9, ALABAMA

PHONES: TREMONT 1-2068 AND 9-6170

FOR SALE

1—Simpson #0 Muller—Style M (never used)

1—Simpson 18" Muller

1—Lancaster Mixer, Model EGB-4

1—Lancaster Mixer, Model EAG-3

3—Link Belt Roto Louver Rotary Dryers, Models 207-10, 310-16 and 604-20.

R. GELB & SONS, INC.

U. S. HIGHWAY 22, RAHWAY VALLEY R. R. UNION, NEW JERSEY

FOR SALE

BONDACTOR, Model 1250L, Cupola patching gun, like new, used 2½ years, complete with extra parts—new air motor, speed reducer, 12 nozzle liners, hose, etc. Address: Box 348, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

One gas fired single station Shell Molding Machine, Model T8M3-GR16, Good, Elec. 3/60/220. Address: Box 330, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING RATES

(Effective Jan. 1, 1960)

POSITION WANTED—Minimum advertisement set solid.

30 words or less $4.00
Additional words .....15c each.

ALL OTHERS—Help Wanted, Employment Service, Wanted-To-Buy, Representatives Wanted, For Sale etc. minimum advertisement set solid,

30 words or less $10.00
Additional words .....35c each.

NOTE: If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

Classified forms close the 13th of month preceding issue.

FOUNDRY

PENTON BUILDING **CLEVELAND 13, OHIO**

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 27.75	$ 26.25	$ 24.75	$ 24.00	$ 23.25
2 inches	54.00	51.00	48.00	46.50	45.00
3 inches	78.75	74.25	69.75	67.50	65.25
4 inches	102.00	96.00	90.00	87.00	84.00
5 inches	123.75	116.25	108.75	105.00	101.25
6 inches	144.00	135.00	126.00	121.50	117.00
7 inches	162.75	152.25	141.75	136.50	131.25
8 inches	180.00	168.00	156.00	150.00	144.00
9 inches	195.75	182.25	168.75	162.00	155.25
10 inches (1 col.)..	210.00	195.00	180.00	172.50	165.00
15 inches (1/2 page)	303.75	281.25	258.75	247.50	236.25
20 inches (2/3 page)	390.00	360.00	330.00	315.00	300.00
30 inches (1 page)	562.50	517.50	472.50	450.00	427.50

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

• FOR SALE

CONVEYORIZED OVEN

Heavy-duty 70 ft. x 45" x 22" annealing and cooling belt conveyor oven. 35 ft. fire brick lined. 30 H.P. high speed blower for cooling. Also, Binks water-wash spray booth, 6 ft. with motors and pump, and Binks automatic spray machine with spray guns. PRescott 3-6350 (Passaic, New Jersey) or write: Box 324, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• FOR SALE

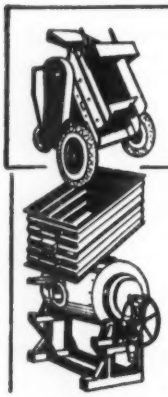
FOR SALE
MOTOR—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51 — Rochester 1, New York

• FOR SALE

FOR SALE

American Sand Conditioner Type "M" 79/60 220 V Good Condition Reasonable.

CONWAY FOUNDRY COMPANY
6400 VERNEY AVENUE DETROIT 11, MICH.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD CLEVELAND 10, OHIO

WHEELABRATORS
3—6 cu. ft. Continuous Tumblast
1—42" x 48", 17½ cu. ft. Tumblast with loader
1—6' Table Airblast w/six aux. tables
2—6' Table Pangborn LF and LE

WANTED!
COMPLETE FOUNDRIES,
SMALL/LARGE.
PROMPT SERVICE.

WITH DUST COLLECTORS
4—EN-2 Pangborn Cabinets 3' x 3' x 5'
4—Sly #4 Blast Mills

MOLDING MACHINES (Automatic)
2—TDA4 Taccones

CORE OVEN
1—Di-Electric Model M800-A Thermonic, 30 KW

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814

— **GLENVILLE 1-1222**

Circle 874 on Page 53

HN

"FOUNDRY EQUIPMENT BY FOUNDRYMEN"

. . . a trademark to remember
a name to trust . . .

HAMLIN-NAGEL, INC.

BOX 192 EDWARDSVILLE, ILLINOIS
in Metropolitan St. Louis

SALES REPRESENTATIVES FOR PORBECK MANUFACTURING COMPANY'S CORE AND MOLD DRYING OVENS

JOLT SQUEEZERS
International PJS-16"
International LJS-10"
Milwaukee 103
Osborn 275JW and 275J
SPO 110J
Tabor Top Squeezers
Tabor Strand Rod

JOLT SQUEEZE ROLLOVER DRAW
SPO 920
SPO 413D
Osborn 332

JOLT ROLLOVER DRAW
International F
International G 30 x 12
Johnson & Jennings 918
Osborn 444
SPO 508
Tabor 30 x 50
Tabor 16 x 22
Herman 40 x 60—10,000#

JOLT PIN LIFT
Davenport 34A
Milwaukee 1536

JOLT SQUEEZE PIN LIFT
International PKL14
Osborn 712PJ
Milwaukee 125, 126, 145, 195

MULLERS
B&P 60—Multrolmatic
Simpson #3 with skip hoist
Simpson #2 Skip & Aerator
Simpson Porto Muller
Clearfield 610
Simpson 1½ UD

Simpson Number 2 Unit Drive Sand Muller With Skip Hoist Areator And Water Meter

AIRLESS BLAST EQUIPMENT

Wheelabrator 48 x 72 with skip and dust collector, excellent condition.
American 66" Swing Table 48 x 48 with Skip Hoist

Wheelabrator 27 x 36 with skip.
Wheelabrator 42 x 48 with skip & collector
Wheelabrator 36 x 42 with skip & collector
Pangborn #3 continuous with feeder & collector
Pangborn 8LF Plain Table

CORE BLOWERS

Demmler 103EO, skip, feeder & automatic cycle
Demmler 3EO, feeder & semi-automatic cycle

Demmler #1 and 2, #55 and 2K
San Bio CB-40-D-LPP
Redford #1 & 2
Champion CB-8 and CB-15 and CB-18

CORE OVENS
Coleman 39' tower combination oil & gas
Porbeck double end gas or oil

SAND CONDITIONING AND HANDLING

Two Twin Hopper Handy Sandys
One Single Hopper Handy Sandy

Screenarator S, M, L.
Royer NDP
American Sand Cutters — various sizes.
Bucket Elevators
Troughing Conveyor 16" x 34' w or w/o magnetic pulley.
Oscillating Conveyor 24" x 30' year 1956.
B & P No. 40 and 60 Preparators

MATERIAL HANDLING

Hough HA Payloaders, Forklifts 2000#, 4000#, 6000#, 7000#, Handling Boxes.
Roura Hoppers

1 Yard Clamshell Bucket
Hoists Air and Electric
Hough HA Payloaders & Forklift Trucks
Champion CB-8 and CB-15 and CB-18
Crane Magnets 39", 42", 50", 55"

METAL HANDLING
Ladles 250#—10,000#
Pouring Devices, various capacities
Motorized Ladle Carrier
12" Cleveland Tramrail

AIR COMPRESSORS
10, 15, 25, 40, and 50 HP water cooled
175 hp synchronous, 2 stage IR-XRE

MISCELLANEOUS EQUIPMENT
Foxboro Air Weight Controllers
Grinders, 18" x 24"
Detroit Hardness Testers
Flasks, Steel, various sizes
Flasks, Aluminum Slip
Flasks, Fremont Magnesium Slip
Jackets, Aluminum & Wopper Jaw
Core Plates—Aluminum & Transite
Cupolas, 2½, 4, 5, 6, 7, 8, 9 and 10
American Core Rod Straightener
Swing Grinders

42" Bullard "New Area" VTL lathe with side head
52" Betts Boring Mill with two loading arms.

FOUNDRY ENGINEERING SERVICE
WANTED! GOOD SURPLUS EQUIPMENT

Circle 875 on Page 53

Two *OUTSTANDING VALUES* from
UNIVERSAL

SAND HANDLING SYSTEM

NATIONAL ENGINEERING UNIT

Consisting of: No. 1½ Simpson U.D. Muller with water meter, National Screen Master Preparator, Skip bucket loaders, 20" x 20' belt conveyor, Bucket elevator, Sand storage bin, 5 Moulder's hoppers.

1957 unit in LIKE NEW CONDITION
Dismantled in our warehouse
Yours for Less than Half of today's replacement value!

SPECIAL RESEARCH TOOL

30 KW ECCO VACUUM FURNACE

Complete High Frequency Vacuum Melting Furnace of latest design.
Consisting of: 30 KW M.G. Set; Ecco High Frequency Control Cubicle; Kinney Model KD-110 Vacuum Pump; Pyrometer.
Dimensions: 7½" dia. x 13" high furnace in water cooled vacuum chamber 31" inside dia. x 42" high.

1954 unit used only 54 hours
In LIKE NEW CONDITION

PARTIAL LISTING OF OUR REGULAR REBUILT MACHINERY STOCK

AIR COMPRESSORS
1—75 hp INGERSOLL-RAND water cooled, horizontal
1—100 hp WORTHINGTON air cooled, 2 stage

BLOWERS
25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM - GREEN, FISHER Positive Pressure & Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—15" Cont. WHEELABRATOR Tumblast
1—26" Cont. WHEELABRATOR Tumblast
1—15" x 20" WHEELABRATOR Tumblast
1—20" x 27" WHEELABRATOR Tumblast
1—27" x 36" WHEELABRATOR Tumblast
1—36" x 42" WHEELABRATOR Tumblast
1—48" x 42" WHEELABRATOR Tumblast.
1—48" x 48" WHEELABRATOR Tumblast
1—48" WHEELABRATOR Swing Table
1—1-A WHEELABRATOR Multi-table
1—WHEELABRATOR Peening Cabinet
1—PANGBORN TABLAST, 8' Table
1—PANGBORN Air Blast Room
1—PANGBORN PIPE CLEANING CABINET
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round

CONVEYORS
1—HEWITT-ROBINS Oscillating, 18" W x 40' L
1—HEWITT-ROBBINS Vibrating, 18" W x 10' L. Model VC-I
1—LINK-BELT Bucket Elevator, 8" x 12" buckets on 14" rubber belt, completely enclosed by 2' x 4" casing.
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
1—SIMPLICITY, 24" x 10" Feeder w/hopper, Model OA-10-JA2

CORE BLOWERS
10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

DUST COLLECTORS
COMPLETE STOCK—both Wet & Bag Type —send us your requirements

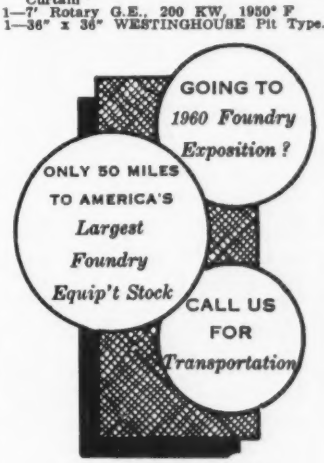
FURNACES—DIRECT ARC MELTING
1—250 lb. LECTROMELT, Side Charge
1—500 lb. LECTROMELT, 200 KVA trans.
1—1000 lb. SWINDELL
1—2000 lb. HEROULT
1—2000 lb. SWINDELL, 3/60 1000 KVA.
1—1¼ Ton HEROULT
1—25 Ton SWINDELL Hyd. Top Charge

FURNACES—INDIRECT ARC
1—10# DETROIT
1—60# DETROIT
1—350# DETROIT LFA
1—750# DETROIT LPY, Conical Shell,
1—1000# DETROIT AAD P, 300 KVA
1—3000# Detroit C, 500 KVA

FURNACES—INDUCTION MELTING & HEATING
1—35 KVA AJAX 60 cy., alum.
1—35 KVA, AJAX SPARK GAP, High Freq., steel
1—1250 KW 2 Ton Cap.
1—30 KW LEPEL, water cooled spark gap

FURNACES—GAS & OIL
2—400# HAUSFELD hand tilt, Oil fired, alum or Magnesium
1—1 #900 JC STROMAN, gas. Like new

FURNACES—HEAT TREAT
1—4' x 4' x 10' Gas Fired Annealing
1—9' x 12' Car Type, gas/oil
1—12" x 36" x 8" high HAYES "Certain Curtain"
1—7' Rotary G.E., 200 KW, 1950° F
1—36" x 36" WESTINGHOUSE Pit Type.



MOLDING MACHINES
Jolt Rollover Pattern Draw
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 42" x 78"
2—HERMAN 7500#, 40" x 50" tables
1—HERMAN 7500#, 40" x 60" table
1—HERMAN 3000#, 30" x 66" table
1—HERMAN 3000#, 32" x 70", 15" cyl. series charging conveyor type
5—HERMAN 1500# to 30" x 48" tables
3—HERMAN 750#, 24" x 30" tables
1—INTERNATIONAL 30" x 12", Type G, 28" x 35" table
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #442, 21" x 31" table, 600#
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 57", 26" draw
4—TABOR 40" x 60", 1500 & 3000#
2—TABOR 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable, 600#
1—TABOR 20" x 30", w/air clamps, 1000#
2—TABOR 14" x 18" Rockover 150#
1—TABOR 40" x 50" table, 3000# capacity

Plain Jolt
1—INTERNATIONAL, 3' x 4' table, 12" cylinder

Jolt Pin Lift
1—HERMAN #4317, 22" x 30" table
2—INTERNATIONAL JDP, 1200 x 8", 24" x 26" table, 8" draw, 1200#, port.
1—OSBORN #589, 25" x 30" table, 6" draw, 1200#
2—SPO #305, 750 lb., 20" x 27" table
1—TABOR 20" x 24" table, 600#

Jolt Squeeze Pin Lift
2—INTERNATIONAL PKL, 20" x 28" table, 14" sq., 5½" draw
2—INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
1—NICHOLLS 18-44, 6½" draw.
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
5—SPO #2114P, 21" x 27" table, 600#
2—SPO #2116, 21" x 27" table, 11" sq., 6" draw

Jolt Squeezers
2—INTERNATIONAL #12 LJS, 16" x 20"
4—INTERNATIONAL #10 LJS, 16" x 20"
10—OSBORN #275J, 16" x 20" table, 400# port.
3—TABOR Squeeze-In Head, 16" x 19" table

MATERIALS HANDLING
1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

MULLERS AND MIXERS
1—B&P #30 Speedmuller w/skip hoist, 3 cu. ft. batch
1—B&P #40 Speedmuller w/skip hoist, 5 cu. ft. batch
1—B & P, Conventional, SIMPSON type, 87½" Dia. arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10-14 cu. ft. batch
1—SIMPSON #0, U.D. 3' Dia
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft.
1—SIMPSON #2, 6' U.D. Dia. 14 cu ft
2—SIMPSON #3, enc. gear, 20-25 cu. ft.
1—SIMPSON #3, 8' Dia. Open Gear, 20-25 cu ft batch

OVENS
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
3—GENRICH, Elec. elevator type, Inspection under operation in N.Y.C.—Excellent Condition

SAND CONDITIONING
1—AMERICAN Sand Cutter, Model AA, 62" cutting reel
1—B & P Nite-Gang
2—B & P Screenarator, Model "S" & "M"
1—LINK-BELT Revivifier
1—MOULDER'S FRIEND, 50" cutting reel
1—ROYER Jr., 7-10 tons/hr., ½ Hp
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP
1—ROYER NC-4, 10-15 tons/hr, 1½ Hp
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
3—ROYERS, NDP, 15-25 tons/hr, 2 Hp
1—SIMPLICITY Type SORG, 4' x 5' screen
6—SIMPLICITY Shakeouts, 3'x10', 4'x8', 4'x10', 5'x8'

SAND SLINGERS
1—B&P Stationary, 2 speed, 19" head, 4" tip with plate feeder
1—B&P Stationary, Single Speed
2—B&P Tractor Type, 16" head
1—B & P Tractor Type, 19" head

UNIVERSAL MACHINERY AND EQUIPMENT CO.

1632 N. Ninth St., Reading, Pa. Phone: FRanklin 3-5103

Send for Our Illustrated Catalog

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

EXCEPTIONALLY POPULAR ITEMS AT REALISTIC PRICES

AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes A, B, C, D, D-6 & E, ½, 1, 2, 3 & 5 ton.
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
1—DETROIT Model LHR, 5 ton, elec.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7, 16 x 8 buckets.

CUT-OFF MACHINES

1—TABOR C10AF, 16" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER #50 Model 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4 & 4E, 10 to 100 lb.
1—FEDERAL 40P-1 San-Blo.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. Cores.
2—REDFORD #2—Magazine type.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SPO Model SC-10-DM, hollow core.

CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—DESPATCH Type "8" 6' w x 16½' l x 7½' h Oil Fired.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.

CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—CUPOLA Bondactor, style 1205-L.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W. Sizes No. 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

4—DETROIT LFA, 350# Cold Charge 700# Molten w/200 KVA transformers.
1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
6—AJAX 35 KW Induction 460 V 1 phase.
1—DETROIT Size CM—4000# Charge, 8000# Molten, w/1000 KVA trans.
2—AJAX 20 KW Hi Frequency Converters.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilt. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, alum. cap. Gas or Oil.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200 & 550 cap.
1—SKLEENAR 1200# Rev., hand tilt.
1—MONARCH 600# Rev., hand tilt.
1—STROMAN, "U" 600# Reverb.
1—STROMAN DC "Dipout" 800# cap.
1—ECLIPSE E1000—Double Chamber Dry Hearth 1000# cap.

GRINDERS

Swing Frame

1—FOX #4 Wheel 24" x 3"—20 HP.
1—MARSCHKE 20" x 10" wheel, 10 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24".

Snagging

4—FOX #7—30" x 3" Wheel, 15 HP.
2—U. S. #64, 20" x 3", 7½ HP, 4 speed.
2—SAFETY #174, 24" x 3" wheel, 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 15 HP, 4 Speed.
U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 2450, & 3000 lbs. capacity.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Mixing Ladles, 2 & 3 ton. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

12—OSBORN No. 275-J—17x20 Table, 10".
2—OSBORN No. 216-PJ—21-32 Table, 16".
6—MILWAUKEE 123—17x26 Table, 12".
2—MILWAUKEE 181—24x36 Table, 18".
10—INT. PVJS—20x26 Table, 12" cyl.
9—SPO No. 110-J—17" x 20" Table, 10".
8—SPO No. 113-J—17" x 26" Table, 13".

Plain Jolt

1—J&J 50" x 72" table—5000# cap.
2—OSBORN 60" x 72" table, 6000# cap.
1—TABOR 36" x 36" table, 1000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—HERMAN 20" x 30"—750# series.
2—HERMAN 26" x 48"—1500# series.
2—HERMAN 50" x 60"—300# series.
2—HERMAN 40" x 48"—400# series.
1—HERMAN 60" x 84"— 6000# series.
1—HERMAN 60" x 84"—10,000# series.
14—INTERNATIONAL TYPE G., Size 20" x 8", 24" x 10", and 30" x 8".
1—J & J #920 RC—44" x 54"—Hyd. head.
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO No. 917-A—40" x 29" Table.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 508, table size 28" x 30".
1—SPO 5050, Table 25" x 30", 10" draw.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT #34 AJS—36" x 46" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" Table.
2—INTERNATIONAL JDP 3000# x 10" Draw 48" x 48" table.
1—J & J #812—30" x 38" Table—10".
1—MILWAUKEE #2542—38" x 42" Table.
2—J & J No. 688 25" x 30" table, 6" draw.
2—MILWAUKEE No. 1030—30x38 Table.
1—MILWAUKEE No. 1536 32x38 Table.
3—MILWAUKEE No. 3548—44x48 Table.
1—SPO #3058, 22" x 28" table, 8" draw.
2—SPO #3070, Table 26" x 35", 10" draw.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
3—MILWAUKEE #196, 17" x 38" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORN 714PJ, 20" x 31" Tables.
1—OSBORN #818—24x36 Table, 18" cyl.
1—MILWAUKEE #246—23¼x42 Table.
4—INTERNATIONAL PKL, 17" x 26".
2—INTERNATIONAL #PK-16—20" x 30".
1—SPO #2136—21" x 30" Table—13" Cyl.
2—SPO 2114P, Table 21" x 27", 11" cyl.

Shell Molding

1—SHALCO, Model HO4, 2 station.

CONVEYORS

Steel Apron

9—JEFFREY & LINK-BELT 24", 30", 36" widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.
LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan.
2—18" W x 18' L x 4" deep pan.
2—SIMPLICITY 24" W x 13' L x 6" Deep.
1—SIMPLICITY 18" W x 11' L x 6" Deep.
1—SIMPLICITY 24' W x 19' x 6".

Roller

2500' MATHEWS 6", 14" wide, 2 9/16" dia. roller, 1¼" hex shaft, 4" channel.
1500—MATHEWS 8" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—DUO-ROLL 88 Cars 20" x 48", 350' track, with automatic dumping.
1—PALMER "B" 106 Cars—42" x 62" w/550' Track.

Belt

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

HOPPERS & STORAGE BINS

1—NATIONAL ENGINEERING "Moulders Helper" 2 Hopper Unit.
7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
1—NEWAYGO HS-7-GT, Handy Sandy.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

3—B & P No. 80 Speed Muller—24 cu. ft. air cooled.
1—B&P #30 Speedmullor, 4 cu. ft., w/skip Hoist Loader—Air Cooled.
1—B&P #60 Speedmullor, 12 cu. ft., w/skip Hoist Loader—Air Cooled.
1—B & P #70 Speedmullor, 18 cu. ft. w/loader.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
1—CLEARFIELD #404, 4 cu. ft. batch.
1—DRAVO-DOYLE 6 cu. ft. cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
2—MASTER 400# Shell Type 5' pan dia.
1—SIMPSON #1-H Style UD, 400# batch.
2—SIMPSON #1½ style UD, 700# w/loader.
2—SIMPSON #2, Style C, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.
1—LANCASTER #EA-4, 6 cu. ft. w/loader.

2—BEARDSLEY & PIPER Speedmullors, Model 80. Cap.—24 cu. ft. Pan diameter 8'-6". W/air operated batch hopper, water meter, dust hood, 15 HP Clarage cooling fan, Multramatic control, 125 HP Motor. Serial #80-61 & 80-60.
4—SIMPSON Sand Mullers, Model 3½-UD. Pan diameter 9'-3", crib depth 42", Unit Drive. Muller wheels 5500# weight, 45" diameter, 13" face. Capacity 45 to 50 cu. ft., 75-ton per hour. With 75 HP.

SAND PREPARATORS

6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
2—MOULDERS' FRIEND 50" x 60" Brush.
2—NEWAYGO RS-V Reddy Sandys.

SANDSLINGERS

2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
6—B & P Tanks for speed slingers.
1—B & P Motive 15' Jib—6' Ram—19".
1—B & P Motive Jr. 8' Jib—4' Ram—19".

1—BEARDSLEY & PIPER Stationary Sandslinger, Model "DB." 5' jib arm, 4' ramming unit, 19" head, 4" cup, 2-speed motor 25 & 16 HP. Serial #676-5403. New 1955.
1—BEARDSLEY & PIPER Model "DB" Stationary Sandslinger 6' ramming unit, 10' jib arm, 19" head, 4" cup, 2-speed motor 40 & 20 HP W/raising & lowering arms. Serial #8-717-5701. New 1958.
1—BEARDSLEY & PIPER 5-ton Roto-Feed Plate Feeder. New 1958.

SHAKEOUTS & SCREENS

2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B.
1—SIMPLICITY 4' x 8' Model D.
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8' Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT

2—AMERICAN 36" continuous Tumblasts.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48", w/skip hoist.
1—AMERICAN 48" x 72" w/loader.
1—AMERICAN No. 2 Tablast — 6' dia.
1—PANGBORN Model 6-GF, 6' diameter plain table with dust collector.
1—PANGBORN 6 LG-14 Multi-Table, 6-24" tables, w/dust collector.
1—PANGBORN Model 14GK-7 Roto-Blast barrel w/loader.
1—PANGBORN 9LG-14 Multi-Table w/6—36" dia. Aux. Tables w/Dust Collector.

AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

THE ACME bargain page

AIR COMPRESSORS
Binks 2 Stage, 2 h.p.
INGERSOLL-RAND 2500 dfm, Steam, 1951

AERATOR
NEWAYGO

BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

BLOWERS
I.-R. 12900 cfm, 100 h.p. 220-440 V, 20 oz.
GE 10500 cfm., 20 oz., 85 h.p., 220 V.
GE 7500 cfm., 20 oz., 89.6 h.p., 220-440 V.
SPENCER 7350 cfm., 16 oz., 50 h.p.
SPENCER 7000 cfm., 32 oz.
GE Centrifugal 6200 cfm., 24 oz., 58 h.p.
SPENCER 3500 cfm, 28 oz., 40 h.p.
SPENCER 2250 cfm., 16 oz., 15 h.p., 220 V.
SPENCER 1350 cfm, 32 oz.
NORTH AMERICAN 1050 cfm, 16 oz.
NORTH AMERICAN 850 cfm.
McKee 200 cfm.

BUFFERS
STANDARD 20 RSB 20 h.p.

CLEANING EQUIPMENT
Model 4836V-B VAPOR BLAST

CONVEYOR
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.

CONVEYORS OSCILLATING
SIMPLICITY 18" x 24'
SYNTRON 24" x 6'
AJAX 12" x 20'6"

CORE BLOWERS
CB15 55# cores, Universal blow plate
DEMMLER #4 up to 250# cores
DEMMLER #55
DEMMLER 2EO
DEMMLER 2K
FEDERAL "SAN-BLO" CB 40
INTERNATIONAL SB15H, up to 150# cores, Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
6—OSBORN 193 up to 50# cores

CORE GRINDERS
5—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS
THERMONIC INDUCTION MODEL 1800A
3—Despatch ET. Drawer Type

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 ton MILWAUKEE; 48' span, 220 V.

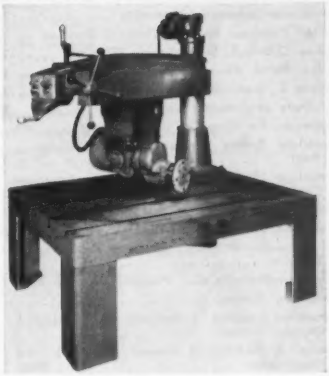
CUPOLA GUNS
1—Bondactor #1250 and 1000

DUST COLLECTORS
PARSONS 40,000 cfm. cloth bag type
ROTOCLONE W14 Arrang. A, 5200 cfm.

ELECTRIC MELTING FURNACES
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# and 350# Tapered Shell 2300 V.

FURNACES
400# Fisher Motorized Tilt, Gas Fired
600# Fisher Stationary
600# Campbell Hausfeld Brass

GRINDERS, MISC.
U.S. #70 Comb. 20" disc & 20"x3"x1½" wh
GARDNER 18" single end disc.
HANCHETT 30" double spindle opposed
GARDNER 26" D.E. Disc.
GARDNER 30" D.E. Disc.
STANDARD 24" x 3" wheel Snag, 2-7½ h.p. motors
72" Gardner Horizontal Disc.
53" Hanchett Horizontal Disc.



DEWALT CUTOFF SAWS for ferrous or nonferrous metals, cutoff or as sprue cutters. Flush blade adaptor takes up to 20" abrasive blade or saw. Power Hoist to arm. Chain & sprocket cross feed for working on heavy cast iron 48" x 60" "T" slot table or off table cutting of large work. Motor swivels horizontal to vertical in yoke.

GRINDERS, SNAG
Marschke 30" x 3", 3 speed snag
120A GARDNER 30" Opposed Disc
35A Standard D.E., 24" x 3" Wheel; (2) 7½ hp motors
U. S. D.E., 20" x 3" Wheel, 15 h.p.

GRINDERS, SWING FRAME
FOX 24" x 3" x 12", 15 h.p.
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type. Bright hardening annealing 1850°
G.E. Elevator Type 2150° Atmosphere Generator

HOISTS
2—4000# Lo Hed, 220/440V
1—500# INGERSOLL-RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers
6000# Cleveland, w/monotractor travel
4—2000# Ingersoll Rand Hoists

INDUCTION MELTING EQUIPMENT
100 KW-Ajax 300# 3000 cycle, 150 h.p. 4 bearings MS set, water cooled, complete controls
30 KW Lepel Spark Gap
35 KW Ajax Tama Wyatt, 60 cycle induction holding furnaces
1000# Ajax Spare Melting Furnaces—Unused

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES JOLT SQUEEZE PIN LIFT
2—OSBORN 712 PJ 18" x 25" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff — rolling molding machines 10" jolt cylinder; 1800# capacity, 26" Squeeze cylinder; 13" draw, Flask size 25½" to 29" wide, 52" long. FACTORY REBUILT.
113 PJ SPO
2—MILWAUKEE 165, 24" x 30", 8" draw

JOLT SQUEEZERS
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ
2—MILWAUKEE 244 Jolt Squeeze car type head
MILWAUKEE 181-7, 24" x 36" table
104 MILWAUKEE
10"—32 Adams

JOLT ROLLOVER DRAWS
HERMAN 10000# late
HERMAN 3000#
2—750# HERMAN 20" x 30" table
1—INTERNATIONAL RJ 20" x 12"
1—SPO 9032

JOLT SQUEEZE ROLLOVER DRAW
2—#331 OSBORN 24" x 30" flask area, 7" draw

JOLT PIN LIFTS
MILWAUKEE 3000#, 38" x 42"
INTERNATIONAL 600 x 8, 20" x 22" table, 8" draw

PLAIN JOLT
40" x 84" Herman
36" x 60" Herman
2—20" x 30" INTERNATIONAL

MULLERS and MIXERS
2—#3 UD Simpson
1—930 Clearfield
CLEARFIELD #404
#2 Simpson OG
#1 Simpson OG

SAND CUTTERS
AMERICAN 51"
JEFFREY SANDITIONER
ROYER NDP, 2 h.p.

SAND SYSTEMS
1—NEWAYGO Super Handy Sandy: Like new

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed

SHAKEOUTS
3' x 5' SIMPLICITY
3' x 10' SIMPLICITY
7' x 8' SIMPLICITY SOM14

SHELL EQUIPMENT
SHELL PRODUCTS 20" x 30" pattern size w/shell blender and bonding press
TSM4 Shell Molding Machine 20" x 30"

SHOT BLAST
SLY #4, 20" x 30" w/dust collector

SLAG DISPOSAL UNIT
AMERICAN MODEL A

SPRUE CUTTERS
1—MILWAUKEE #85 TON

STRAIGHTENING PRESS HYDRAULIC
150 ton HPM
150 ton Farquhar "C" Frame
100 ton Watson Stillman "C" Frame
60 ton Lempco 4 post
60 ton Farquhar "C" Frame

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
GOGAN Model 1414-2V
TYLER ROTAP Testing Sieve w/screens
TINIUS OLSON Brinnel Hardness Tester Production Bench

TUMBLING BARRELS
1—ROYERSFORD, 42" x 72", chain drive, late
SLY, 24" x 48"; 3 H.P.
SLY, 30" x 60" Duplex.

WHEELABRATORS
27" x 36" American w/skip
2—20" x 27" AMERICAN, w/rubber belt
1—42" x 48" AMERICAN Skip Loader.
AMERICAN #2 Tabiast 8-28" tables, late
PANGBORN LD1-Airblast Table
PANGBORN GD1-Airblast Barrel

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
HERMANCE 24" Planer
JONES SUPERIOR 48" Double Disc
BOICE CRANE 12" Planer
OLIVER #290 Dbl Arbor, Tilt-Arbor Saw
1—OLIVER 182D, 15" Disc Sanders
WALLACE 8" Jointer
CRESCENT 24" Planer
ONSRUD W-244 & W-240 Routers
8", 12" and 30" Jointers

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire plant

126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA

FOUNDRIES MATERIALS COMPANY

"STANDARD OF THE MIDWEST" • BINDERS • FACINGS • SANDS • CLAYS • REFRACTORIES • FOUNDRY EQUIPMENT

Manufacturers of KORWELD COREPASTE & MASTERMIX WASHES

COLDWATER, MICHIGAN. BRoadway 8-5668

DETROIT, MICHIGAN. 2705 W. Warren Ave., TYler 8-1115

Professors of Foundrydom

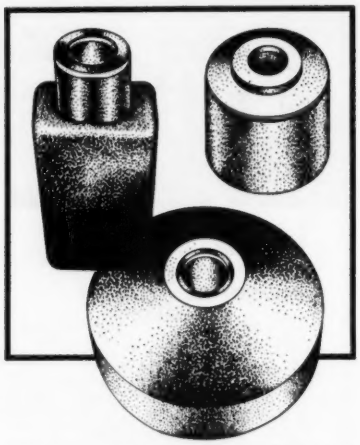
Circle 819 on Page 53

Advertising Index

Acme Foundry Co. 342
Adams Co., The 96, 97
Airetool Manufacturing Co., The 208
Air Reduction Co., Pure Carbonic Co., Division 38
Ajax Flexible Coupling Co., Inc. 2
Ajax Magnethermic Corporation 66, 67
Alabama By-Products Corporation 343
Aluminum Company of America 362
Allied Chemical General Chemical Division .. 352
Allied Chemical, Semet-Solvay Division 259
Alloy Metal Abrasive Co. 334
Alloys & Chemicals Corporation 336
All-State Engineering Co., Inc. 195
American Air Filter Co. 40, 41
American Bridge Division of United States Steel 212, 213
American Chain & Cable Co., Inc., American Chain Division 314
American Cystoscope Makers, Inc. 358
American Foundry Flask Co. 359
American-Marietta Co., Marietta Concrete Division 10
American-Marietta Co., Presstite Division 220, 221
American Optical Co. 115
American Smelting & Refining Co., Federated Metals Division 99
Ansco, A Division of General Aniline & Film Corporation 105, 247
Aquadyne Corporation 384
Arcair Co., The 190
Archer-Daniels-Midland Co., Federal Foundry Supply Division 6, 7
Arrow Butt Co. 384
Atlas Copco 310, 311
Aurora Metal Co., Faskure Coated Sand Division 337

Babcock & Wilcox Co., The, Refractories Division 323
Baird-Atomic, Inc. 263
Baker Perkins, Inc. 218
Baroid Chemicals, Inc., A Subsidiary of National Lead Co. 44, 45
Bartlett, C. O., & Snow Co. ..... Back Cover
Bay State Abrasive Products Co. 50, 51
Beardsley & Piper 235, 236, 237, 238
Bell, M. A. Co. 231
Berkshire Chemicals, Inc. 386
Bliss, E. W., Co. 305
Branford Co., The 344
Branson Instruments, Inc. 281
British Moulding Machine Co., Ltd. 335
Brown Metals, Inc. 301
Burr Aluminum Products 361

C & S Products Co., Inc. 192, 193
Campbell-Hausfeld Co., The 12
Cannon Vibrator Co. 386
Carborundum Co. ..... 303, Inside Front Cover
Cardox Division of Chemetron Corporation .. 42
Carman, Edwin S., Inc. 356
Carrier Conveyor Division, Chain Belt Co. .. 252
Carver Foundry Products Co. 94, 95
Cedar Heights Clay Co. 215
Cement Gun Co. 340
Central Pattern Co. 358
Centrifugal Casting Machine Co. 353
Chain Belt Co., Carrier Conveyor Division .. 252
Chase Foundry & Manufacturing Co. 355
Chemetron Corporation, Cardox Division 42
Chicago Hardware Foundry Co., The 356
Chicago Pneumatic Tool Co. 327
Chicago Wheel & Mfg. Co. 283
Chisholm-Moore Hoist Division Columbus McKinnon Chain Corporation 328
Chris, A. C., Co. 361
Cincinnati Milling Machine Co., The 197
Clark Equipment Co., Construction Machinery Division 47
Clearfield Machine Co. 120



CUT YOUR COSTS and SAVE YOUR PATTERNS with ARROW BUTTS and PEINS

Over one half million have been used with complete satisfaction. Send for catalog on complete line of butts and peins. We feature 13 types. Sand rammer butts are our business, not our sideline.

ARROW BUTT COMPANY

4800 W. 139th St., Cleveland 35, Ohio

Circle 820 on Page 53

Water Works

HARDER-FASTER

when conditioned with the

AQUADYNE SYSTEM

The water you use in (1) sand conditioning, (2) core and mold washes, (3) cupola linings, and (4) CO_2 core cleaning has greater penetration and dispersion when conditioned in the simple AQUADYNE way, thus . . .

- *Reduces the amount of water needed*
- *Reduces sand temperature*
- *Makes sand feel wetter than it really is*
- *Wets sand, clay, dust, etc., faster*

Write for literature
Dealer inquiries invited

AQUADYNE CORPORATION

89 TERMINAL AVENUE

CLARK, N. J. • FUlton 1-3036

Circle 821 on Page 53

Advertising Index

Cleveland Chaplet & Manufacturing Co. 131
Cleveland Flux Co., The 48
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 80
Cleveland Vibrator Co., The 347
Columbus McKinnon Chain Corporation, Chisholm-Moore Hoist Division 328
Combined Supply & Equipment Co., Inc. 359
Cosa Corporation 273
Curtis Manufacturing Co. 312

Davey Compressor Co. 86
Dayton Pneumatic Tool Co. 350
DeBardeleben Coal Corporation 354
Deister Concentrator Co., Inc., The 265
Delta Oil Products Corporation 21
Dommler Manufacturing Co. 245
Denver Fire Clay Co. 356
Desmond-Stephan Mfg. Co. 342
Detroit Electric Furnaces, Kuhlman Electric Co. 282
Detroit Testing Machine Co. 300
Diamond Alkali Co. 349, 351
Dietert, Harry W., Co. 93
Dixon, Joseph, Crucible Co. 296
Domestic Industries, Inc. 353
Duff-Norton Co. 277
Durez Plastics Division, Hooker Chemical Corporation 240, 241

Eastern Clay Products Department, International Minerals & Chemical Corporation 82, 83
Eastman Kodak Co., X-Ray Division 297
Elwell Parker Electric Co. 207
Euclid Crane & Hoist Co., The 350

F. E. North America, Ltd. 227
Fanner Manufacturing Co., The 127, 128, 129
Federated Metals Division, American Smelting & Refining Co. 99
Ferro Corporation, Refractories Division 329
Foundries Materials Co. 384
Foundry Design Co. 275
Foundry Equipment Co., The 28
Foundry Supplies Manufacturing Co. 60
Fremont Flask Co., The 108
Fuller Merriam Co. 307

Gardner-Denver Co. 24
General Aniline & Film Corporation, Ansco Division 105, 247
General Dynamics Corporation, Liquid Carbonic Division 327
General Electric Co. 49
Globe Steel Abrasive Co., The 307
Gordon, Claud S., Co. 264
Great Western Mfg. Co. 361
Green, A. P. Fire Brick Co. 233

Hammond Machinery Builders, Inc. 352
Hanna Furnace Corporation, The 324, 325
Hansberg Shooters, Inc. 101
Harbison-Walker Refractories Co. 11
Harnischfeger Corporation 71, 72
Hartley Controls Corporation 265
Hawley Manufacturing Co. 264
Herman Pneumatic Machine Co. 74, 75
Hevi-Duty Electric Co. 55
Hickman, Williams & Co. 279
Hines Flask Co., The 76, 77
Hoeganaes Sponge Iron Corporation 266
Homer Manufacturing Division, The Ohio Electric Mfg. Co. 351

Hooker Chemical Corporation, Durez Plastics Division 240, 241
Hough, Frank G., Co., The 119
Hutchinson Shell Mold Co. 332
Hunt Valve Co. 189

Imperial Belting Co. 246
Indiana General Corporation, Stearns Magnetic Products Division 249
Inductotherm Corporation 116
Industrial Equipment Co. 70
Ingersoll-Rand 298
International Automation Corporation 289
International Basic Economy Corporation, Valvair Division 32
International Clay Machinery of Delaware, Inc. 284
International Foundry Supply Co. 256
International Minerals & Chemical Corporation, Eastern Clay Products Department 82, 83
International Molding Machine Co. 106, 107
International Nickel Co., Inc., The 64, 65
Iron Lung Ventilator Co. 304

Jeffrey Manufacturing Co., The 52
Johns-Manville 313
Johnston Manufacturing Co. 302
Joy Manufacturing Co. 315, 317, 319

Kaiser Aluminum & Chemical Sales, Inc. 280, 281
King Tester Corporation 328
Kirk & Blum Manufacturing Co. 274
Knight, Lester B., & Associates, Inc. 123, 124, 125, 126
Koch, George, Sons, Inc. 346
Koppers Co., Inc. 248
Kuhlman Electric Co., Detroit Electric Furnaces 282
Kux Machine Co. 122

Lanly Co., The 267
Lectromelt Furnace Division, McGraw Edison Co. 255
Lindberg Engineering Co., Lindberg-Fisher Division 84, 85
Link-Belt Co. 87
Liquid Carbonic Division of General Dynamics Corporation 333

McGraw Edison Co., Lectromelt Furnace Division 255

Machine Products Corporation 358
Macklin Co. 117
Magnaflux Corporation 306
Magnet Cove Barium Corporation 59
Manhatton Rubber Division Raybestos-Manhattan, Inc. 276
Manning, Maxwell & Moore, Inc. 88
Marietta Concrete Division, American-Marietta Co. 10
Mathews Conveyer Co. 294
Mayer, Carl, Corporation 210
Metal Blast, Inc. 272
Metallizing Company of America, Inc. 357
Miller Electric Manufacturing Co., Inc. 100
Milwaukee Chaplet & Mfg. Co. 288
Modern Equipment Co. 388
Moltrup Steel Products Co. 349
Moulders' Friend, The 338
Murphy, James A., & Co., Inc. 360

FOUNDRY

Penton Building, Cleveland 13, Ohio
Main 1-8260

BUSINESS STAFF

GEORGE A. POPE
Business Manager

MARY JANE KIMPEL, Advertising Service Mgr.

DAVID D. GIBBS, Market Research Mgr.

S. F. MARINO, Promotion Dir.

J. M. CASTIGLIONE, Production Mgr.

G. R. EBERSOLE, Distribution Mgr.

BETTIE COOK, Circulation Mgr.

MILDRED CHRISTOPHER, Census Mgr.

JEANNE CORSIGLIA, Staff Asst.

JUNE SCHILENS, Reprint Service

Branch Offices

New York 17 .... 60 East 42nd St.
J. F. AHRENS, J. L. OZANNE
Murray Hill 2-2581

Chicago 11 .... 520 N. Michigan Ave.
A. W. JOHANSEN, L. R. HETKE
Whitehall 4-1234

Cleveland 13 .... 1213 West Third St.
E. H. THOMAS, K. L. MOUNTAIN
A. L. KLINGEMAN
Main 1-8260

Birmingham 9 .... 249 La Prado Place
F. J. ALLEN
Tremont 1-8598

Los Angeles 36 .... 5943 West Colgate Ave.
F. J. FULLER
Webster 1-6865

San Francisco 4 .... 57 Post St.
ROBERT W. WALKER CO.
Sutter 1-5568

Detroit 35 .... 15800 West McNichols Rd.
Broadway 3-8150

Pittsburgh 19 .... 2837 Koppers Building
Atlantic 1-3211

Washington 4 .... 1123 National Press Building
Executive 3-6849

Clearwater, Fla. .... 1954 Jeffords Drive
H. G. ROWLAND
(Clearwater) 31-4121

Dallas 35 .... 818 Exchange Bank Building
JAMES H. CASH
Fleetwood 1-4523

London .... 2 Caxton St., Westminster, S.W. 1
JACK C. G. CRUMP

Published monthly by

THE PENTON PUBLISHING COMPANY

GEORGE O. HAYS .... Chairman
RUSSELL C. JAENKE .... President
FRANK G. STEINEBACH... Vice Pres. and Secretary
FRANK O. RICE .... Vice President
JOSEPH P. LIPKA... Treasurer and Asst. Secretary

Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST • AUTOMATION

FOUNDRY is edited primarily for management, production, technical and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve key foundry personnel on an individual or routed basis. A limited number of copies is supplied at no cost to educational institutions.
Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2.

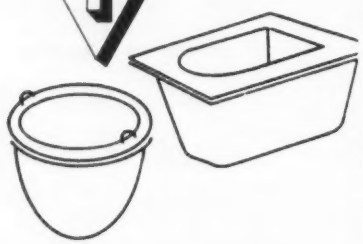
Member
Business Publications Audit Inc.
National Business Publications Inc.
Industrial Advertising Research Institute

BPA NBP

SPECIFY

TIFFIN QUALITY

"Mark of Quality"



MELTING POTS

There is

A TIFFIN FOUNDRY

Quality Melting Pot for all Non-ferrous Metal.

- IMMEDIATE DELIVERY on all standard size melting pots from stock.
- LONGER LIFE—The iron used in our melting pots is especially engineered for its heat and erosion resisting qualities. This means longer pot life.
- REAL ECONOMY—Pound for pound of melted metal, it costs less when you use Tiffin Foundry Quality Pots.
- SPECIAL POTS available. Send us your specifications.
- OVER 50 YEARS EXPERIENCE in the manufacture of quality pots and die equipment.

SPECIFY the pot with the trademark of quality—they are engineered to last.

DIES, PLUNGERS, NOZZLES & BAR STOCK ALSO AVAILABLE

Write today for complete information.

THE TIFFIN FOUNDRY, INC.
TIFFIN, OHIO

Circle 822 on Page 53

Advertising Index

National Carbon Co., Division of Union Carbide Corporation 46
National Chemical & Plastics Co., The 360
National Engineering Co. 109, 110, 111, 112, 113, 114
National Metal Abrasive Co. 339
National Pigment Co., Inc. 285
Newaygo Engineering Co. 39
New York & New Jersey Lubricant Co. 355
Nomad Equipment Corporation 23
Nopco Chemical Co. 347
Norton Co. 30, 31, 62, 63

Ohio Crankshaft Co., The 121
Ohio Electric Mfg. Co., The 242
Ohio Electric Mfg. Co., The, Homer Manufacturing Division 351
Olin Mathieson, Metals Division 102, 103
Oliver Machinery Co. 357
Orefraction Minerals, Inc. 300
Osborn Manufacturing Co., The 199, 200, 201, 202
Ottawa Silica Co. 56, 57

Pangborn Corporation 8, 9
Pasadena Hydraulics, Inc. 350
Peabody Engineering Co. 299
Pekay Machine & Engineering Co., Inc. 29
Peninsular Grinding Wheel Co. 271
Penn Iron Works, Inc. 352
Pennsylvania Glass Sand Corporation 253
Penola Oil Co. 257
Permanent Mold Die Co., Inc. 68
Pickands Mather & Co. 225
Picker X-Ray Corporation 118
Pittsburgh Coke & Chemical Co. 331
Pittsburgh Metals Purifying Co., Inc. 260
Porter, H. K., Co., Inc., Refractories Division . 132
Prestite Division American-Marietta Co. .220, 221
Pure Carbonic Co., A Division of Air Reduction Co., Inc. 38

Quincy Foundry, Inc. 318

Raybestos-Manhattan, Inc., Manhattan Rubber Division 276
Redford Iron & Equipment Co. 98
Reichhold Chemicals, Inc. 104
Remington Arms Co., Inc. 316
Republic Steel Corporation 89, 90, 91, 92
Rexarc, Inc. 354
Reynolds Metals Co. 1
Richards-Wilcox Manufacturing Co. 27
Robeson Process Co. 358
Ross Operating Valve Co. 345
Rudow Manufacturing Co. 357

SPO, Inc. 14, 15
Schneible, Claude B., Co. 58
Schramm, Inc. 330
Scientific Cast Products Corporation, The 351
Security Alloys Co., Inc. 308
Sherritt Gordon Mines Ltd. 341
Simonds Abrasive Co. 79
Simplicity Engineering Co. 223
Smillie, C. M., & Co. 354
Smith, G. E., Inc. 16, 17
Smith Oil & Refining Co. 291

Get it fast from

BERKSHIRE CHEMICALS Inc.

630 Third Ave., New York 17, N. Y.

Sales Offices: New York • Chicago • Camden Cleveland • Boston • Pittsburgh • San Francisco

Circle 823 on Page 53

VIBRATORS

One-Piece End-Mounting

Style "A"

Style "B"

Style "C" Shake-Out

Get free catalog write

CANNON VIBRATOR CO.
1111 POWER AVENUE
CLEVELAND 14, OHIO

Circle 824 on Page 53

Advertising Index

Spencer Turbine Co., The 286
Spincraft, Inc. 318
Spraying Systems Co. 353
Standard Electrical Tool Co., The 262
Standard Horse Nail Corporation 302
States Engineering 354
Stearns Magnetic Products Division of Indiana General Corporation 249
Steel City Testing Machines, Inc. 338
Sterling National Industries, Inc. 134
Stevens, Frederic B., Inc. .....Inside Back Cover
Superior Graphite Co. 387
Sutter Products Co. 22
Swindell-Dressler Corporation 18, 19

Tabor Manufacturing Co., Division of Turbo Machine Co. 43, 295
Taylor, Charles, Sons Co., The 20
Taccone Corporation 5
Thor Power Tool Co. 320
Tiffin Foundry, Inc., The 386
Timken Roller Bearing Co., The 25
Tomkins-Johnson Co., The 13
Tousey Varnish Co. 250, 251
Turbo Machine Co., Tabor Manufacturing Co., Division 43, 295

Union Carbide Metals Co., Division of Union Carbide Corporation 229
Union Carbide Plastics Co., Division of Union Carbide Corporation 26
U. S. Smelting Furnace Co. 234
United States Electrical Tool Co., The 326
United States Graphite Co., The, Division of The Wickes Corporation 287
United States Gypsum 81
United States Rubber, Mechnical Goods Division 185
United States Steel, American Bridge Division 212, 213
Universal Clay Products Co. 344

Valvair Division, International Basic Economy Corporation 32
Vanadium Corporation of America 73

Walker Peenimpac Machine Mfg. Division, Walker Pump Co. 387
Walker Pump Co., Walker Peenimpac Machine Mfg. Division 387
Waltz Furnace Co. 130
Wedron Silica Co. 78
Westover Corporation 267
Wheelabrator Corporation 204, 205, 206
Whirl-Air-Flow 269
Whitehead Brothers Co. 37
Whitehead Metals, Inc. 292, 293
Whiting Corporation 209
Wickes Corporation, The, The United States Graphite Co., Division 287
Wilson, Thomas C., Inc. 355
Wilson Welding Co., Inc. 61
Wolverine Equipment Co. 359

Yale & Towne Manufacturing Co., The 133

Classified Advertising 377, 378, 379, 380, 381, 382, 383

FOUNDRY PRODUCTS

MINERS • IMPORTERS • MANUFACTURERS

"CARBON-RAISER"
(Trade Mark Reg.)

Used in Iron Foundries to increase carbon and improve machinability of castings. In Steel Foundries to increase combined carbon content.

COLLOIDAL GRAPHITE in various vehicles	**CORE PASTES** Strong bond, dry quickly.
HYDRO GRAPHITE (It's New!) Excellent permanent mold wash.	**SOAPSTONE—Talc**
FOUNDRY FACINGS	**"MOLDUKO"** (Trade Mark Reg.) **CORE & MOLD PROCESS** Produces smooth castings. Stops "burning in". Air-dries.
CORE WASHES (All Types)	**PIPE REDUCER** Used on gates and risers in steel and iron foundries.
INGOT MOLD WASHES	**LADLE WASH**
PARTING (Dry or Liquid) Non Silica or Tripoli, highest quality.	**MUDDING COMPOUNDS**

SUPERFLAKE GRAPHITE PRODUCTS

SUPERIOR GRAPHITE COMPANY
TELEPHONE: RANDOLPH 6-7939
33 South Clark Street Chicago 3, Illinois

Circle 746 on Page 53

AT LAST! Airless Blast Cleaning Equipment *All Foundries* Can Afford: PEENIMPAC

SEE IT AT THE FOUNDRY SHOW BOOTH 1336

LOWEST in
Initial Cost
Operating Cost
Maintenance Cost . . . .

HIGHEST in
return per dollar invested

3 cu. Ft.	$2,375.00
7 cu. Ft.	3,575.00
12 cu. Ft.	4,975.00
24 cu. Ft.	11,975.00

Comes assembled and complete with electrical equipment

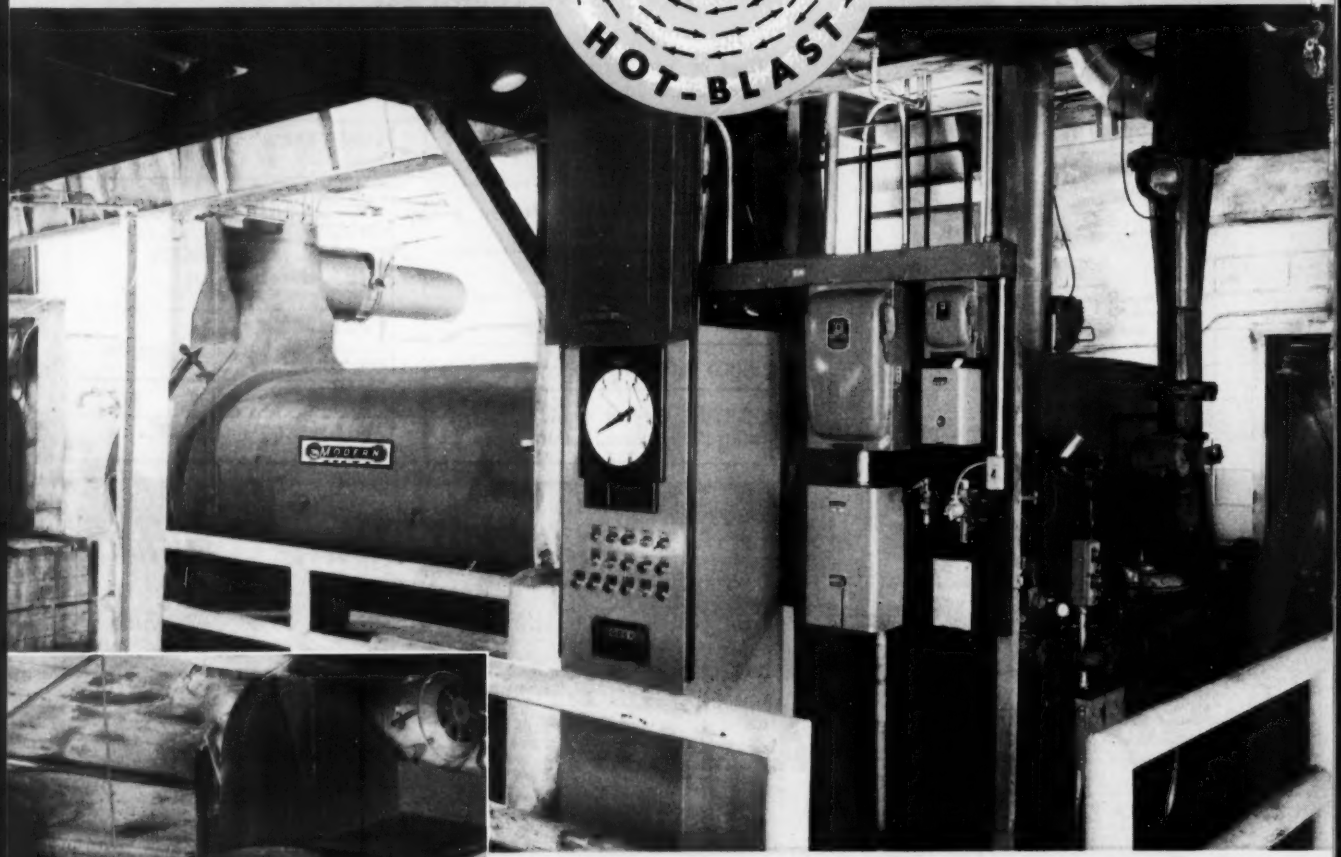
WALKER PEENIMPAC MACHINE MFG. DIV.
WALKER PUMP CO. 546 11th ST., BROOKLYN 15, N. Y.

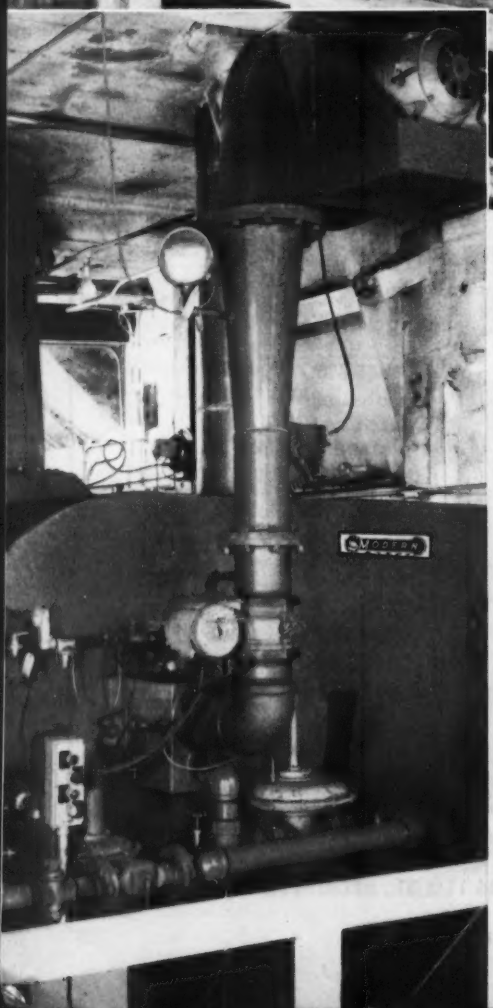
Circle 825 on Page 53

MODERN

RECIRCULATORY Eff. to 85% HOT-BLAST

COST CUTTING!





750° F., MODERN, hot-blast heater is supplying 7500 CFM to MODERN, externally, water-cooled cupola at Neenah Foundry Co., Neenah, Wis.

NOTE: Names of other heater installations, in foundries, supplied on request.

ASK ALL ABOUT IT...Booth 1409

Recirculating the products of combustion boosts efficiencies as high as 85% in MODERN, indirect-externally-fired, hot-blast heaters. The counter-flow and cross-flow principle of gas-to-air heat transfer provides a scrubbing action which results in a higher, heat-transfer coefficient. The smooth inner and outer surfaces of the tubes assure minimum pressure drop and maximum tube cleanliness. Pilot, ignition and safety equipment meets all state safety codes.

MAJOR USER BENEFITS INCLUDE:

- *Lowered coke ratios . . .*
- *Reduced oxidation . . .*
- *Decreased refractory cost . . .*
- *Uniform metal temperatures . . .*
- *Hotter iron is tapped . . .*
- *Bridging is eliminated . . .*
- *Fewer castings scrapped . . .*
- *Lower sulfur pick-up . . .*
- *Increased melting efficiency . . .*
- *Less costly charge substitute . . .*
- *Chemistry is more uniform. . .*
- *Melting rate increased . . .*

Since every hot-blast requirement does present individual problems we welcome every opportunity to discuss the over-all need in its early planning stages . . .

MODERN EQUIPMENT COMPANY

Dept. F-5

Port Washington, Wisconsin

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Circle 826 on Page 53

See for yourself how the

NEW STEVENS MULLER CUTS FOUNDRY COSTS!

LOOK AT THESE FOUNDRY-PROVED FEATURES!

IT'S FAST—thoroughly mixes a uniform batch in less than two minutes.

IT'S COMPACT—occupies only seven square feet of floor space.

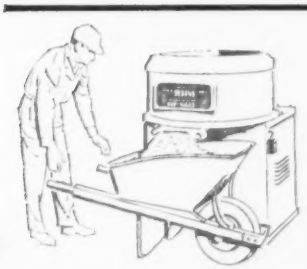
IT'S ECONOMICAL—initial cost and maintenance requirements are low.

IT'S CONVENIENT—four-foot height permits easy hand loading. Unique overhang design allows fast discharge and easy accessibility.

IT'S RUGGED—field-tested to give extra-long, trouble-free service life.

IT'S VERSATILE—provides superior performance with all types of binders.

- *Fast efficient batch mixing*
- *Easiest loading and unloading*



Write today for complete information on this remarkable, new foundry equipment. It's available for immediate delivery. Remember, too, that Stevens is your best source for all your foundry facings, equipment and supplies.

SEE THE NEW STEVENS MULLER IN OPERATION AT THE A.F.S. EXPOSITION, BOOTH NO. 1014

EVERYTHING FOR THE FOUNDRY

frederic b. **STEVENS,** inc.

DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND
INDIANAPOLIS MILWAUKEE NEW HAVEN SPRINGFIELD (OHIO)

Circle 552 on Page 53

SEE THESE AND OTHER NEW

Mold Handling Systems

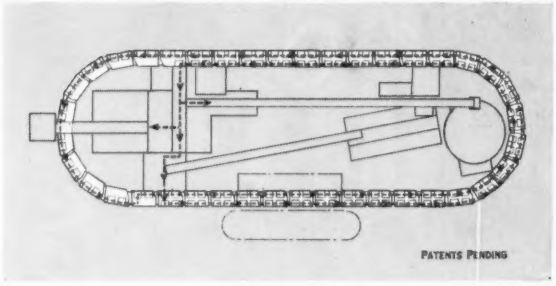
BARTLETT-SNOW
CLEVELAND 5, OHIO

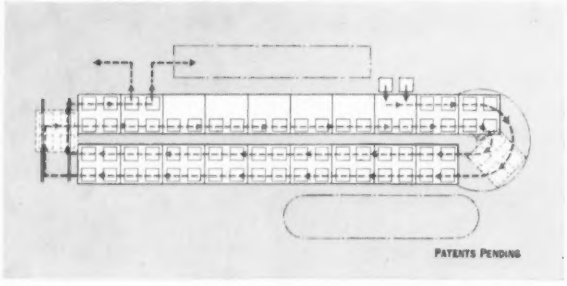
75th ANNIVERSARY

IN BOOTH 1515 AT THE FOUNDRY SHOW

"*Double MLC*" Mold Handling System

Snap or tight flask molds are set out in outside position on the car, poured, and travel almost completely around the loop. They are then transferred automatically to inside position on the car, and continue around the loop again for automatic removal at the shakeout. These new systems provide almost twice the cooling time of a conventional mold conveyor carrying only a single line of molds; effecting substantial savings in floor space, equipment, building, and other facilities.



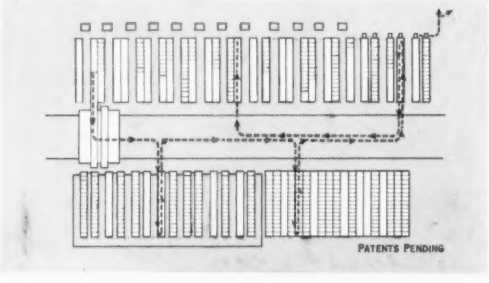


"*Double MRI*" Mold Handling System

Rectangular loop, consisting of two straight runs connected with a rotary turn and transfer car. Cars advance one car length, then remain stationary for timed period so large molds can be loaded onto the conveyor, poured, and the molds removed, while the conveyor is stationary. Molds are carried side by side on the cars and make almost two complete trips around the loop, thus nearly doubling the cooling time per square foot of floor space.

"*MF*" Mold Handling System

Unlimited flexibility for jobbing foundries. The transfer car delivers pallets loaded with similar molds, to the pouring, cooling, and shakeout zones, and returns the pallet with the bottom boards and bands—or flasks—to the molding area. Handling similar molds together permits molds for different castings to be kept separate, and even poured with different metals, without interfering with other groups of castings. Slow jobs do not hold up the fast jobs. Molding, pouring, cooling and shakeout are centralized, minimizing the equipment requirement.



Write today for a copy of Bulletin No. 135. It gives full details about eight different types of Bartlett-Snow Mold Handling Systems.

THE C. O. BARTLETT & SNOW COMPANY

Designers, Engineers, Fabricators and Erectors of Foundry Equipment

HOME OFFICE—CLEVELAND 5, OHIO • NEW YORK • DETROIT • BUFFALO • PHILADELPHIA